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Contractors and Engineers Monthly

Vol 46, No. 1

JANUARY, 1949

\$3 a Year, 50 Cents a Copy

Covering the Field

• Tell Public of Highway Needs

That's the only way a modern highway system will be financed, says a director of highways. Page 1 carries the story.

• Boysen Dam Begun

The triple-barrel article on page 2 includes grading and tunneling work to relocate a railroad at the dam site.

• Concrete-Paving Rampage

Some 1,600 feet of paving completed per 10-hour day. Page 5 covers methods. See page 33, too, for granular sub-base work on the same 10-mile project.

• Two New Bridges

Self-powered buggies speed concrete deck pours on one bridge. Page 10. Concrete-pile bents support another new structure. Page 77.

• Sewage Plant Constructed

Unorthodox methods used to pour and strengthen concrete digester tanks at the plant are reported on page 17.

• Tractor-Scrapers Grade Road

Job also calls for gravel base, surface treatment, and plant-mix seal. Turn to page 25 for details.

• Foolproof Materials Hoist

Here's how materials-handling accidents were prevented in the erection of a tall office building—page 30.

• Building Construction

The Seattle-Tacoma Airport gets a new modern terminal building. See page 36. And Clayton, Mo., gets a new modern department store. See page 66.

• Asphaltic Road Job

A fast-moving contractor pushes grading, granular base, and asphaltic-concrete pavement. Story on page 41.

• County Halts Road Damage

Heavy logging trucks have brought no good to Douglas County, Oreg., roads. Counterslack is described on page 47.

• Efficiency in Seeding

On page 54, an Ohio Landscape Architect discusses erosion control through economical turf establishment.

• Locks for River Improvement

The Pearl River navigation project has been reopened, with work on Lock No. 1 in full swing. See page 59.

• Labor Shortage? What's That?

So might contractor D. R. Smalley ask—with his six sons in the business. His Portrait in Print is on page 73.

• Radio Revamps Road Work

The article on page 84 and the pictures on pages 70-71 tell how an FM communication system was installed statewide, and what the results have been.

• Airport for Mile-High City

Bituminous-paving equipment mobilizes surface Stapleton Field at Denver—as described on page 99.

(You will find "In This Issue" on page 4)



C. & E. M. Photo

A \$3,000,000 terminal building of modernistic design and reinforced-concrete construction is being built at the Seattle-Tacoma Airport by Lease & Leigland. Pours have required intricate form work, as the article on page 36 reports.



C. & E. M. Photo

Crushed base material for a new section of U. S. 10 near Valley City, N. Dak., was produced by this Cedarapids portable crusher. Page 41 describes W. H. Noel Co.'s contract, including grading and asphaltic-concrete paving operations.



C. & E. M. Photo

Wason Construction Co. set up this Strayer 1-yard portable concrete plant near the work trestle from which Lock No. 1 was built on the Pearl River in Louisiana. Details of lock construction and an account of the navigation project as a whole appear on page 59 of this issue.

Step 1 in Financing State Highway Needs

Only When U. S. Taxpayers Are Told The Facts About Their Roads Will Adequate Funds Become Available

By CLARENCE B. SHAIN, Director of Highways, State of Washington

STRIPPED of all superfluous detail and stated in its simplest terms, one basic clear-cut problem confronts state highway officials today: Our state highway systems are woefully inadequate to handle the traffic which is imposed upon them.

In order to bring them up to acceptable standards, we must first make an objective and scientific study of our needs, and then obtain sufficient funds to build the needed improvements. Now many states have accomplished much in solving the first phase of the problem—determining just what their highway needs are. But the financial question is, as far as I can determine, still unanswered.

Needs of Pacific-Coast States

Legislative interim committees on highways in many states throughout the nation have done much to point up the serious shortcomings in our road systems, and to evolve intelligent and integrated remedial action. For example, such surveys are either under way or have been completed in the three Pacific-coast states, and their findings are rather startling.

In California, for instance, the long-range program of state highway improvement needs, as reported by the highway department engineering committees to the legislative interim committee, indicates the need for the expenditure of \$2,011,689,355. Of this sum, \$1,721,065,355 is for needed construction, and \$290,624,000 is for operation. This means that if California is to meet its minimum highway needs within the next decade, a way must be found to provide its Highway Department with a yearly income ranging from \$111,000,000 in 1950 to \$128,000,000 in 1959.

Although California is ahead of most states in evolving an increased road financing program, sufficient funds to do all the required work are not available. True, the Collier-Burns Act in that state is expected to increase highway revenue by \$723,704,000 during the next 10 years. This is a tremendous step in the right direction and it is an example of the value of advance planning followed by information to the public. Still, California is almost \$160,000,000 short of the amount required to modernize her highways completely within the next decade.

The tragic aspect of the whole highway finance problem is that the states are like individuals suffering from a serious disease but lacking the funds necessary for medical attention. The condition grows more serious through delay, and when treatment can no

(Continued on page 35)

Work Starts at Boysen Dam; Grading, Tunnel Relocate RR

Earthen Barrier Across Big Horn River in Upper Tributary Headwaters Is Link of Vast Basin Plan

IN the early days of the west, before buffalo and elk became scarce in the Big Horn Basin, the Shoshone Indians used to scour the land each autumn in search of meat. One of the main stream valleys of this vast hunting ground was the flood plain of the Big Horn River, which winds a tortuous course from the mountains towards the Yellowstone, and finally to the Missouri.

Legend has it that Washakie, the grand old chief of the Shoshones, first pointed out to his friends, the white men, a good site for a dam to impound irrigation water for the land. The site which Washakie suggested was near the head of Wind River Canyon on the Big Horn River, about 20 miles south of the present town of Thermopolis, Wyo. Washakie died in 1900 at the age of 94, but much of the lore of the west remained behind him, for he had been unusually communicative with the white men.

In the year 1907, Washakie's thought bore fruit. Allen Boysen, a Wyoming white man, began with private funds the construction of a low-head concrete dam across the muddy stream, where two sheer rock canyon walls drop straight down to the canyon floor. Boysen installed hydroelectric water wheels common to that day, to generate electric power for the small towns in the vicinity. Eventually the towns of Thermopolis, Riverton, and Shoshoni were linked together by a transmission grid.

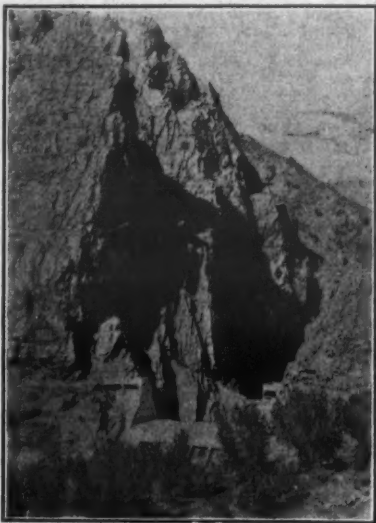
Disaster struck in 1923, after the dam had been operated only 15 years. A flood came roaring down the Big Horn. Silt and water combined to jam the outlet gates. And though men worked frantically, the river soon backed up and flooded a near-by railroad tunnel owned and operated by the Chicago, Burlington & Quincy Railroad. The Burlington Railroad immediately got a court injunction against the continued operation of the dam, and Boysen saw his dream come to an end in the roar of high explosives which blew the superstructure of the dam away to relieve the floodwater.

Dam Now to Be Rebuilt

In 1948, high explosives again were reverberating down the narrow Wind River gorge near the old dam site. The

(Continued on page 101)

By RAYMOND P. DAY,
Western Editor



Photo, Courtesy of John R. Barry, Morrison-Knudsen Co., Inc.
Before high explosive blew it to pieces, old Boysen Dam looked like this. Note the high gorge walls of Wind River Canyon forming a backdrop.

2,800,000 Cubic Yards Gouged From Mountains To Build New Roadbed For Burlington Trains

MAN-MADE scars can be seen today in the dun-colored mountains near the head of Wind River Canyon, Wyo. They represent the power of modern grading equipment, and exemplify the speed at which great quantities of earth and rock can now be moved.

Over these high fills and through the cuts, future trains of the Burlington Railroad will pass, traveling that part of the railroad system from Denver to Billings, Mont. Some 14 miles of new relocated roadbed was necessary to carry the railroad around the reservoir soon to be formed by construction of Boysen Dam, near Shoshoni, Wyo.

The immense dirt job is being done for the U. S. Bureau of Reclamation by Gibbons & Reed of Salt Lake City. The company has a subcontract with the Boysen Dam joint-venture firms sponsored by Morrison-Knudsen Co., Inc. Ballast, trackwork, and ties are being laid on the completed grading under another subcontract with Royce Ker-shaw.

While field supervision of the job is

(Continued on page 14)

Tricky, Tight Ground Squeezes Steel Braces As Tunnel Crews Drive Treacherous Tubes

FROM "Woody's Well" both ways, the tunnel excavation at Boysen Dam was something for the miners to remember. Ground water, shale, and squeezing formations were encountered every day. The earth and rock of Wyoming's mountains was so treacherous there that heavy 8-inch H-beam arches had to be placed on 12-inch centers part of the way, literally lining the roof and walls with steel before concrete work was ever done.

The job consisted of a total of 7,000 feet of railroad tunnel and 300 feet of tunnel driving under the dam spillway for the diversion of the river. All the railroad tunnel was of common dimension with vertical sides and a semi-circular arch. It was mucked out 21 feet wide at the bottom, inside the steel supports, and 29½ feet high from the floor to the top of the arch. Later, when the excavation is all completed, the tunnel will be lined with 24 inches of concrete. The heavy 8-inch steel H-beams will, of course, remain in place permanently.



Photo, Courtesy of John R. Barry, Morrison-Knudsen Co., Inc.
This is one of the shop-made D8-mounted mucking machines which is working on tunnel excavation at Boysen Dam. A hydraulic crowd on each side of the scoop permits the front end of the bucket to crowd into the roof pile.

Small openings also are to be made at various intervals to permit signalmen and track-maintenance pedestrians to get out of the way of trains if they should be caught in the tunnel.

Almost all of the tunnel is driven excavation, but there are several short cut-and-cover sections as well. There the ground was excavated by the open-cut method. After the tunnel lining is poured, the earth will be backfilled.

"Woody's Well"

Woody Williams is a project manager who learned long ago to get right in where the work is toughest as soon as possible. He was definitely confronted with a bad formation at Boysen. Ex-

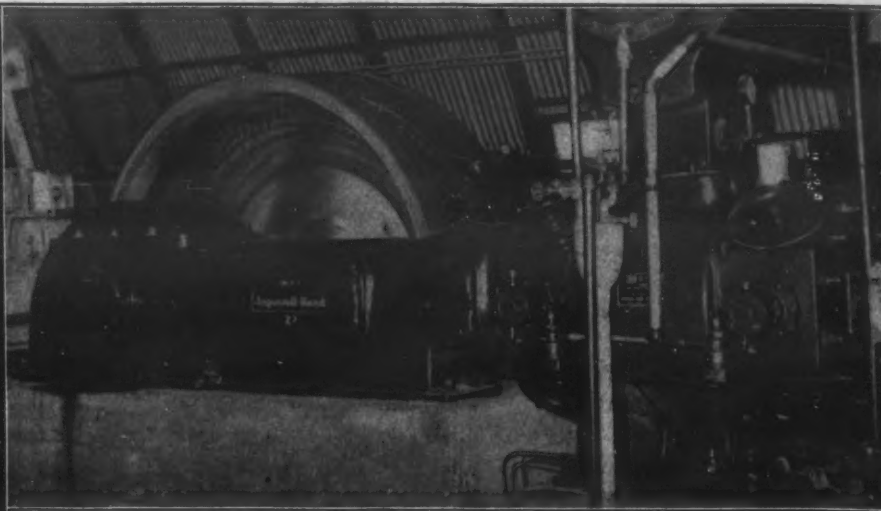
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Three random views of work at Boysen Dam show (below) drillers sinking holes to start the deep spillway cut; a Euclid loader (right, above) digging rooted siltstone in one of the cuts; and Morrison-Knudsen's 54-B Bucyrus-Erie dragline (right, below) rigged as a crane, pouring concrete on one of the C. B. & Q. railroad bridges—part of the railroad-relocation job.

Photos, Courtesy of John R. Barry, Morrison-Knudsen Co., Inc.





Photos, Courtesy of John R. Barry, Morrison-Knudsen Co., Inc.
A shop-made mucking machine (left) dumps a load of broken rock to a Koehring Dumptor during tunnel excavation at Boysen Dam. Above is one of two Ingersoll-Rand compressors which furnished air for the job, including tunnels. At right are the steel supports which were put in, virtually lining the tunnel, to hold the squeezing ground. In the background is the overhead jumbo, which is rail-mounted at the spring line of the arch.

plorations and borings showed beyond doubt that extremely wet, bad conditions were likely to be found near the middle of one mile-long stretch of tunnel.

Reasoning that perhaps he might dry this section up by dewatering if he used the cut-and-cover method there, Williams sought and got permission to try the scheme. When the cut was opened up at that point, all the ground water and shale the plans had indicated were there. Pumps were put to work 24 hours a day, and, of course, it wasn't long before most of the men on the job had dubbed the waterhole "Woody's Well".

Except for several slides at this point, in which nobody was killed, the scheme proved generally successful. It was possible to face off and drive both ways from this location, with a great saving of haul distance for the excavated muck. When the tunnel portals were started, progress was necessarily slow and dangerous, but the farther in the headings went, the drier the formation and the faster the progress.

Job Organization

The tunnel job was organized with provisions for four headings, at least two of which were to be active at all times during the excavation life of the project. Each heading used a flat overhead jumbo, rail-mounted at the spring line of the arch, and a timber jumbo mounted on a Euclid. The latter machine operated from the tunnel floor.

A shop-made mucking machine was also located at each heading to load out the blasted stone after each shot. These mucking machines were patterned somewhat after conventional smaller makes, with the added innovation of a hydraulic crowd on each side of the scoop, which permits the front end of the bucket to crowd into the rock pile. A conventional D8 Caterpillar tractor was used as the framework for each mucking machine.

On all but one of the machines, the diesel engine was replaced by a 100-hp electric motor. The front skip, the hydraulic controls, and the discharge throat were all assembled and made up in the Morrison-Knudsen shop on the job. One mucking machine, recently completed, retained its diesel engine. It will be used on the short river-diversion tunnel.

The crew for each heading consisted of a walker, a shifter on excavation, a shifter on steel bracing, 8 miners, 11 chuck tenders, 5 Koehring Dumptor drivers, a mucking-machine operator, a crane operator for setting steel, and a watchman.

Two compressor houses were set up to serve the job. Their output was synchronized and delivered through steel-pipe headers all over the job. In each

(Concluded on page 109)

Wins New Hampshire's OK

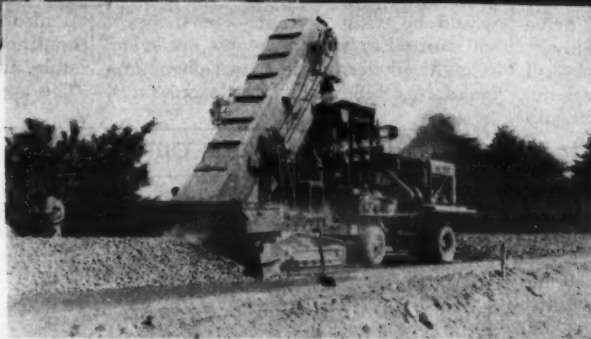
State tries road building with Texaco Asphalt by traveling-plant method . . . plans more of this type



U. S. Route 3, Meredith, N. H. Texaco RC-4 Cutback Asphalt and crushed gravel were mixed by traveling-plant in the construction of this resilient, skid-resistant surface.



Route 12, Keene, N. H. Same type of Texaco Asphalt construction as at Meredith, except that broken stone was used as aggregate, instead of crushed gravel.



Traveling-plant picks up aggregate at left, coats it uniformly with Texaco Cutback Asphalt and discharges mix at right. W. H. Hinman, Inc., of North Anson, Me., was the contractor on both the Meredith and Keene projects.

During 1948 for the first time, New Hampshire employed the traveling-plant method in surfacing two sections of its state highway system. Texaco RC-4 Cutback Asphalt was used as binder in both projects, with broken stone in one case and crushed gravel in the other. Results obtained were so satisfactory that the state plans to use the same type on other sections of its highway system.

Briefly, aggregate was placed in a windrow on the road by spreader box. The traveling-plant picked up the aggregate, coated it thoroughly and uniformly with Texaco Cutback Asphalt, then discharged the mix in a second windrow. The

mix was bladed evenly over the road and rolled to a compacted thickness of 3 inches. A gallon of Cutback Asphalt per square yard went into the mix, plus 1/4-gallon for seal-coating.

When constructing Texaco Asphalt street, highway, airport and other surfaces, road builders employ a variety of methods. The best method for a particular project depends upon traffic volume, aggregate and asphaltic material to be used, availability of an asphalt plant and other factors. Two helpful booklets, which describe all types of Texaco Asphalt construction, may be obtained by writing our nearest office.

THE TEXAS COMPANY, Asphalt Sales Dept., 135 E. 42nd Street, New York City 17
Chicago 4 Denver 1 Houston 1 Jacksonville 2 Philadelphia 2 Richmond 19



TEXACO ASPHALT

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Contractors and Engineers Monthly

A NATIONAL BUSINESS PAPER
For the Highway and Heavy-Construction Industry

Issued Monthly by Battenheim-Dix Publishing Corp.
Editorial and Business Office: 470 Fourth Ave., New York 16, N. Y.
Acceptance under the Act of June 3, 1934, at Mount Morris, Illinois,
authorized March 26, 1945.

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Daily News Bldg., Chicago 6, Ill.
Duncan A. Scott & Co., Mills Bldg., San Francisco 4, Calif.
2338 Ben Lomond Drive, Los Angeles 27, Calif.

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Toll Gates and Tax Diversion

Over the radio a comedian recently quipped, "They're putting a toll gate on the road to Shangri-La". The crack was not particularly funny, but neither is the increasing number of toll gates being put up on roads and bridges all over the country. Early in American history, toll gates across the road were usually a symbol of private ownership. They all but disappeared during the period of public ownership and control of highways, but now they are enjoying a renaissance, and the motorist is made painfully conscious of their existence as he digs for the tribute.

Follow the traveler on a trip, by no means imaginary, through the northeastern quarter of the United States, if you would see the heaviest concentration of new or nearly new toll facilities. He begins driving—and starts paying—away down east in Portland, Maine, at the northern entrance to the Maine Turnpike. At the end of a 50-mile drive south to the New Hampshire border, he has to yield another coin to cross the bridge spanning the Piscataqua River. The New Hampshire continuation of this fine highway, also a toll road, is already under way and will extend to the Massachusetts line. To reach downtown Boston from the north, the quickest way is to drive under the harbor in the Sumner Tunnel—for a fee, of course. A toll bridge is now being built over the Mystic River which will open up another pay approach to the Hub.

More toll bridges greet the traveler as he swings down through Connecticut—a toll to get across the Thames River at New London, and another on the brand-new structure spanning the Connecticut River at Old Lyme. When he reaches the parkways, beginning outside of New Haven, he'd better get his change purse open and leave it open. First a coin for the Wilbur Cross Parkway, then another for the Merritt Parkway, both in Connecticut; then a third on the Hutchinson River Parkway as he enters Westchester County in New York State.

But when the motorist tries to toll his way through New York City to the Jersey shore, he really pays. Of course he can enter Manhattan without a toll if he leaves the smooth-riding parkways to risk getting lost in the Bronx in order to cross the Harlem River on one of the low-level swing spans. If he stays on the parkway, he will pay at the high-level Henry Hudson Bridge. And if he tries approaching Manhattan via Queens, he can get caught twice for East River tolls—first on the White-stone or Triborough Bridges from the Bronx to Queens, and later in the Queens-Midtown Tunnel from Queens to Manhattan.

From Manhattan to New Jersey there is no escaping a toll, either on the George Washington Bridge or through the Holland or Lincoln Tunnels. Once

on the west side of the Hudson the driver can put his money back in his pocket for a while, but possibly not for long. New Jersey is already considering a 90-mile toll highway across the state. This would by-pass the congested areas at Trenton and in the Camden-Philadelphia region, to connect with a new toll bridge being built across the Delaware River below Wilmington, Del. To the west is the greatest of the toll highways—the Pennsylvania Turnpike—extending nearly to Pittsburgh.

There the toll highways end, but the bridges do not. New spans with toll gates are to be projected across the Ohio at Lawrenceburg in Indiana, and across the Mississippi River at St. Louis. And the eastern half of the country has no monopoly on the toll idea. Oklahoma is proposing a 100-mile toll turnpike between Oklahoma City and Tulsa.

The circle seems to be swinging full round, from toll gates on the first roads in America, through an era of free highways, and now back again to toll gates. And with apparently no strenuous objections from the traveling public. The motorist supports the toll facilities, not cheerfully, perhaps, but philosophically, knowing what his lot would be without them. For the new toll turnpikes and parkways are wide, straight, modern, safe roads, unencumbered by traffic lights, grade crossings,

or traffic congestion. And the free highways they have generally superseded are most often found on narrow, winding, dangerous, heavily congested parallel routes. Who wouldn't pay to travel the new highway—provided he could afford it?

Yet never has the country's need for more free highways been greater. And never has the diversion of gas-tax money to non-highway use been greater. Though some states with toll facilities have not diverted any highway taxes from highway use, the national tax diversion in 1947 amounted to \$170,518,000, an 80 per cent increase over 1946! A lot of free-road mileage could be built with \$170,518,000—to accommodate the motorist who can't afford to leave his change purse open when he travels.

No matter what one's viewpoint on this complicated problem of toll gates and tax diversion, at least one generalization can be drawn from it: Using the fees and taxes from gas, oil, new motor vehicles, etc., for highway purposes alone would greatly lessen the need for additional toll facilities.

Contracts, Specifications: A Guide for the Engineer

The legal aspects of writing specifications and engineering contracts are discussed in a book published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. Entitled "The Specifications and Law on Engineering Works", it was prepared by Walter C. Sadler, Professor of Civil Engineering at the University of Michigan.

The book is designed to be a practical aid for the engineer not trained in law, and to provide him with a thorough foundation for writing foolproof specifications. It discusses several legal problems often encountered by engineers, and it covers the various aspects of contracts, and what makes them binding or invalid; patent laws; types of business ownership; and workmen's compensation laws. It also analyzes the differences between Roman or civil law, and English or common law.

The book draws heavily upon decisions handed down by the various judicial bodies in cases at law in which engineers or engineering were involved. It also seeks to guide the engineer or contractor in avoiding, as much as possible, undesirable legal entanglements. The appendix contains a sample set of

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detailed contracts and specifications covering the construction of a transmitter building for the University of Michigan. The book is 493 pages in length and sells for \$5.00.

Stop-and-Go Signs Adopted For Repair-Project Areas

The traditional red flag used to warn motorists of repair projects is disappearing from the highways of Kentucky. It is being replaced by reversible stop-and-go signs operated by the repair crews.

The Kentucky Department of Highways feels that these signs will be an improvement over the old flagging method. M. F. Johnson, Maintenance Director of the Department says, "Often when a motorist sights a flagman on the highway, he does not know whether to slow down, speed up, or continue at normal speed. When he sees one of these new signs, he will know to come to a complete stop." When motorists are stopped, they will be advised of the length of the stretch under repair and will be asked to proceed with caution. The stop signs will be posted at each end of the repair project.

Bridge-Designing Contest

A contest to advance the progress of welding design in bridge construction is announced by the Trustees of The James F. Lincoln Arc Welding Foundation. The competition is open to any engineer or designer who feels he is qualified. The Rules Committee and Jury of Award is under the direction and Chairmanship of Wilbur M. Wilson, Research Professor of Structural Engineering at the University of Illinois. First prize is \$3,000, second prize is \$1,500, third prize is \$750, and there are ten honorable-mention awards of \$100 each.

The bridge to be designed is a two-lane deck highway bridge supported on two end piers 120 feet apart. It is to be designed for ASTM-A7-46 steel and for H20-44 loading. Except for these specifications, the designer is free to exercise his ingenuity. He may conceive and use new structural shapes, provided they could be readily produced if a demand for them should develop; and he may assume the availability of fabricating facilities other than those now in existence.

The "Welded Bridges of the Future" Award Program closes June 30, 1949. Further details and rules and conditions of the program may be obtained by writing to the Foundation at P. O. Box 5758, Cleveland, Ohio.

Steel is as essential to peace as it is to war. Salvage of all available industrial steel scrap is needed to maintain steel production. Be sure to help all you can to save steel scrap.

IS THIS OUR HIGHWAY FUTURE?



Contractor Speeds Up PCC Highway Paving

Koss Uses Latest-Model Equipment to Concrete 10 Miles of Two-Lane Road in Rolling Terrain

THE same concrete-paving crew which, in 1947, finished 8.2 miles of concrete pavement in four calendar weeks was on a paving ramp again this past season. In 1947 the good showing was made in Iowa. In 1948 the crew was working in Missouri . . . moving so fast that it finished its first job in April!

The Missouri division of Koss Construction Co. of Des Moines was the outfit. The job was a 10-mile stretch of 24-foot 8-inch uniform reinforced-concrete paving on U.S. 40 near Foristell, about 50 miles west of St. Louis. The Missouri State Highway Department spent \$500,000 on the Koss contract, which included concrete paving, sub-base work, curbs, gutters, and two small drainage structures. The job was geared to a speed of 1,600 feet of finished paving each 10-hour day. The outfit had poured 2,325 feet in 10½ hours earlier in the season, on another Missouri job in Madison County.

Route 40 is one of the main transcontinental highways through Missouri and carries heavy traffic. Many large western trucking concerns use it through Missouri, and the road has become obsolete. Ultimately, Missouri's highway engineers hope to make Route 40 a four-lane divided highway from St. Louis to Kansas City, and some of this work has been done from St. Louis out to the new Missouri River bridge at Weldon Springs. The Koss job was the first major link in the four-lane system west of Weldon Springs.

Experimental Design

While the entire Koss job consisted of 8-inch uniform portland-cement concrete paving, reinforced with ¼ x 6 x 12-inch mesh steel mats, the base under the concrete is largely experimental. Also, about half the job has expansion joints on 40-foot centers, with no contraction joints. The other half has contraction joints on 50-foot centers, and no expansion joints.

Most of the job rests on 4 inches of granular base course, but a short piece of pavement was laid on raw compacted-earth subgrade. Meramec River chert gravel and crushed limestone were both used in building the sub-base. (See article on page 33.)

The new route passes through gently rolling terrain, with good alignment.

Job Organization

The Koss Construction Co. paving outfit is well organized and almost 100 per cent mobile, so that it can move rapidly from job to job. Just one week after the first 1948 job was finished, Koss had moved 120 miles to Foristell and was set up ready to pave. Unfortunately, though, a week of rain more or less canceled out the time saved by this rapid move.

Offices, parts bins, tire and oil storage, and most of the repair facilities are housed in big Fruehauf trailers. By leaving the materials and parts in place in their racks, Koss saves valuable time as well as labor. With a place for everything, and everything in its place, mechanics are also much more familiar with the set-up from job to job.

Field safety was in evidence everywhere on the Foristell job. Outside the field office a scoreboard announced 132 working days without a lost-time accident the day the job was visited. And Koss hoped to pave 400,000 square yards of highway in the 1948 working season without any lost-time accidents.

Trucks, operating in traffic, offered the worst threat to this safety goal. Convinced that eternal vigilance is truly the price of safety in connection with trucks, the Koss company used its own trucks, hired experienced drivers, and saw that a careful man spotted the loads at the paver. Crew members got safety tips from their foremen every day in the week.

Other organizational problems of the job consisted of setting up the batch plant, laying out a yard site in the center of the job, and arranging subcontracts.

Koss Construction Co., incidentally, subcontracted the paving from the Condon-Cunningham Co., of Omaha, prime contractor on the job. Koss, in turn, (Continued on next page)



C. & E. M. Photo

As the birds saw the Koss Construction Co. concrete-paving job on U. S. 40, near Foristell, Mo.—the bucket of the Koehring 34-E paver dumping a load of concrete, and finishing equipment bringing up the rear.

Better... by a dam site!



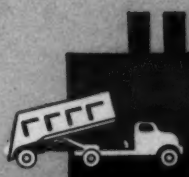
WINCH-LIFT HAULS MORE PAY LOADS



Capacities: 8 to 25 cu. yds. • Larger models quoted on request.

*Keith Williams, Vicksburg, Mississippi
Sub Contractor, Narrows Dam and McNary Dam.

**R. E. DeWitt, Inc., Pavilion, N. Y.
Sub Contractor, Mt. Morris Dam.



WINCH-LIFT DUMP TRAILERS

FOR FURTHER INFORMATION WRITE DIRECT TO WINCH-LIFT TRAILER CO., 324 STONER AVE., SHREVEPORT, LOUISIANA

- ★ NARROWS DAM, ARKANSAS
- ★ McNARY DAM, OREGON
- ★ MT. MORRIS DAM, NEW YORK

KEITH WILLIAMS says "I selected WINCH-LIFT for the Narrows Dam project because it had the simple light weight construction that means greater payloads and less maintenance. After thorough tests under difficult hauling conditions on this project, the WINCH-LIFT Trailers so thoroughly proved themselves that I am now using them on the McNary Dam near Portland, Oregon."

BYRON DEWITT says, "After thoroughly testing two WINCH-LIFT trailers, I purchased a fleet for the Mt. Morris Dam project, because they not only haul larger legal payloads, but are better balanced and present no maintenance problems."



C. & E. M. Photos
Fine-grading on the Koss paving job was handled by a Buckeye RB power Finegrader (above). Excess granular base material, which was paid for by the ton and supplied by Tobin Quarries, was dumped to trucks to be carried ahead and re-used. At right, workmen stake steel center-joint sections and set dowel-steel for a contraction joint. Note the spreader bar between the opposite form and the joint material.



Contractor Speeds Up PCC Highway Paving

(Continued from preceding page)

subbed the base material to Tobin Quarries of Kansas City; purchased the sand from St. Louis Materials Co.; and purchased coarse rock aggregate from St. Charles Quarries.

Batch Plant on Railroad

The Koss batching plant, where dry concrete materials were proportioned, was set up in Foristell on a spur line of the Wabash Railroad. It was in almost the exact center of the job. The dead haul was negligible, and about 5 miles was the maximum truck haul.

The plant consisted of a Johnson 80-ton sand bin, a Johnson 105-ton 2-compartment rock-aggregate bin, a Johnson 75-barrel Dutch Mill bulk-cement silo, a Northwest 1½-cubic-yard clamshell on sand, and a new Koehring Model 605 crane and 2-yard clamshell which unloaded and transferred the two sizes of rock aggregate.

All sand, rock, and cement arrived by rail over the Wabash railroad. On peak days, Koss expected to handle about 18 cars of rock, 10 cars of sand, and 4 cars of cement. The cranes had a 25-foot crawl-way, also used for a batch-truck road, between the railroad track and the stockpiles. They clammed the ma-

terial out of the cars, stockpiled it near the proper batching bin, and then kept the bins filled while paving was in progress. Most of the sand and aggregate was received and stockpiled before the paving crew and equipment arrived from southern Missouri.

The Johnson aggregate and sand bins were set up in such fashion that batch trucks could drive through under each bin, instead of backing in. The cement plant, in which bulk cement from Missouri plants was weighed, was also set up in this manner. Three suppliers of bulk cement shipped to the job: Missouri Portland, Marquette, and Alpha. The hopper-bottom cars in which the material was shipped were unloaded to a feeder hopper under the railroad track, and fed to the storage silo by the Dutch Mill screw-type feeder.

Koss has standardized on International KB-6's and 7's for batch hauling. From 12 to 18 such machines, mostly KB-7's, saw service at Foristell. The larger number was of course used on the extreme 5-mile haul. Two batches, with a dry yield of 31.577 cubic feet each, were hauled on each truck.

Each truck went in first under the rock bin and picked up two batches of rock aggregate. A short trip under the next Johnson bin accounted for the sand. Then the trucks picked up the bulk cement, and the driver closed a flexible cover over the batches before

departing for the job.

The concrete was generally batched according to the following formula:

Sand	1,727 lbs.
Fine aggregate	1,448 lbs.
Coarse aggregate	1,448 lbs.
Cement	684 lbs.
Water	45.7 gals.

The area around the batch plant was also used for the job field yard, with the big Fruehauf trailers spotted along the north side of the property, away from the railroad.

Form and Grade Preparation

About 3,000 road-feet of 8 x 8-inch Blaw-Knox steel road forms were used, and after a big day's pour only about 1,000 feet of forms were out in front. By 10 a. m. next day, however, the form crew was about 1,500 feet ahead, and usually by noon it was 2,000 feet ahead.

Koss men and equipment compacted and prepared the granular sub-base, and they left it in good shape ahead of the paving equipment. Form trenches

were cut for the steel forms by a Cleveland Formgrader, guided by a tight string line.

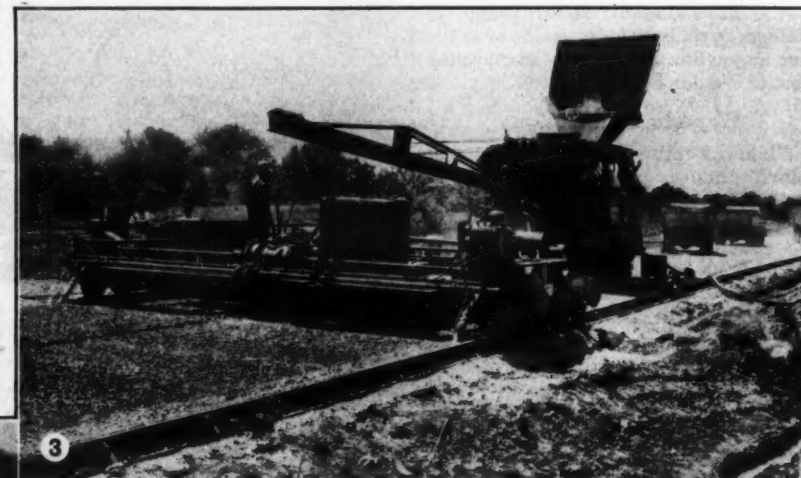
The form-setting crew was made up of 2 setters, 6 laborers, 3 form liners, and a stake man. After the forms were set in place, aligned, and staked, a Jaeger power form-tamping machine compacted dirt under the base to insure a firm bearing under the heavy paving equipment to follow. Workmen then sprayed the sides of the forms with form oil just ahead of the paver, using care to keep the slippery stuff off the top.

Fine-grading was done by a Buckeye RB power Finegrader. This machine, pulling itself along with the aid of steel cables, excavated excess granular material and elevated it into trucks. The crushed base material was paid for by the ton, and state engineers wanted to save it and move it on ahead. After the Buckeye machine finished its work, the grade was checked slightly high with a

(Continued on next page)

1. A LeTourneau Carryall, drawn by a Caterpillar D8, grades a section of U. S. 40 near Foristell, Mo. 2. On the Koss concrete-paving subcontract, a Jaeger form tamper works on the Blaw-Knox road forms to insure firm bearing under heavy paving equipment which is to follow. 3. As fast as the Koehring 34-E Twinbatch paver can dump concrete, a Jaeger spreader is there to process the material. 4. Just behind the spreader is a Jaeger Type X diagonal-screed finisher. 5. After finishing operations, Hunt Process clear curing compound is applied to the concrete slab from power sprayers.

C. & E. M. Photos





C. & E. M. Photo
"Everything going smoothly," Koss
Superintendent Al Beuerlein (right)
tells Orville Matliff, Resident Engineer
on the U. S. 40 paving job.

struck off 3 inches below the top surface by the spreader, which backed up at rapid speed. Then the mats were laid in place, the remainder of the concrete was poured, and the slab was ready for its final dressing.

Concrete Spreading, Finishing

No matter how fast it operated, the Koehring 34-E paver never got ahead of the fast new spreading and finishing equipment Ross used for the first time in 1948. In fact, according to General Superintendent Al Beuerlein, this equipment has successfully handled the output of two 34-E pavers on airport work.

The first piece of equipment in the line-up behind the big paver was a new Jaeger spreader, which took the fresh

concrete and laid it out evenly between the steel forms.

Just behind the spreader was another new machine: a Jaeger Type X diagonal-screed concrete finisher. The machine was well suited to the Foristell job because of curves which sloped one way without any crown—a characteristic of divided highways. The front screed of this machine is transverse, but the rear screed can be set diagonally by a turn of a control wheel near the operator. Because the operation of the diagonal screed is independent of traction, the Type X Jaeger finisher can put an initial surface on concrete slabs no matter at how slow a forward speed it travels. As the machine swept excess laitance off the slab making its initial pass, one puddler watched carefully to

take care of any excess concrete.

Concrete was vibrated at the time the spreader and finisher did their work. On the back of the spreader frame were two Jackson internal-type vibrators which could be let down in the concrete near the forms. These machines insured thorough vibration and a good stripping face at this point. The front end of the Jaeger finisher carried two sections of Jackson tube vibrators, which worked on the surface of the slab as the finisher moved along.

A Flex-Plane machine behind the Jaeger finisher cut the contraction joints, and men set the asphaltic filler in place. The final mechanical finish was put on by a Koehring Longitudinal Finisher, after which two men with

(Concluded on next page)

string line and rule, and rolled by a Galion smooth-wheel single roller.

Prefabricated sheet-metal longitudinal-center-joint material was set in place just ahead of the paver. The material came to the job in 10-foot sections, and was centered in its proper location with the aid of a spreader bar from joint to form. A steel pin every 30 inches held this material in place. To complete the center joint, round steel dowels $\frac{1}{2}$ x 36 inches were set at right angles through holes in the sheet metal, and supported on each end by steel pins. The dowels were placed halfway in the slab, 4 inches off the ground. Each piece of joint material was carefully checked to keep its top surface $\frac{1}{2}$ inch below the surface of the concrete.

The contraction joints were made up of $\frac{3}{4}$ x 16-inch steel dowel bars, on 12-inch centers, supported in a steel basket and staked down to the sub-base. These dowels also are 4 inches off the base. After the concrete was poured, the joint was completed by inserting $\frac{1}{4}$ x 2 $\frac{3}{4}$ -inch asphaltic-mastic joint filler across the surface of the slab, in a slot cut by a Flex-Plane machine.

Expansion joints consist of 3/16-inch mastic material and $\frac{7}{8}$ -inch steel dowels.

Paver Lays Concrete Pavement

The first modern high-capacity machine on the paving line-up was a big Koehring 34-E Twinbatch dual-drum paver, equipped with a 35-foot steel boom and a dual-gate bucket. For the Foristell job, this big machine was spotted on the sub-base between the steel forms, and batch trucks came in to the paver through an opening every 500 feet where several sections of forms were left out temporarily.

Movement of trucks into the paver skip was controlled by a dump man, and each time the paver crawled ahead, the operator sounded a warning blast of the whistle on the paver.

Mixing water was taken from a creek in the center of the job, and was handled by truck-mounted water tanks. The tanks were filled by a 3-inch centrifugal pump with a standpipe. A 60-foot piece of 3-inch rubber hose between the tank and the paver fed the water to the Koehring 34-E. The water-tank trucks used the highway shoulder outside the form lines, and they traveled on a temporary road smoothed by a Caterpillar motor grader.

When the batches were mixed the specified time, the operator ran the big bucket out to the end of the boom and dumped the concrete on the sub-base. The first batch dropped astraddle the metal center joint, then a batch was put next to each form, and the paver walked ahead.

A crew of five men working around the paver kept the center-strip metal in place, set dowel bars, and carried in the 11-foot 8-inch x 19-foot 10-inch mats of reinforcing steel. The fresh concrete was

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C. & E. M. Photos

Contractor Speeds Up PCC Highway Paving

(Continued from preceding page)

long-handled steel floats dressed the concrete surface down to a fine finish. The concrete on this job was handled successfully at a 1-inch slump, and there was very little excess mortar behind, even when the steel floats worked on the slab.

The concrete slab was cured immediately after the finishing operation by Hunt Process clear curing compound applied by two power sprayers. One machine worked from each side, dispensing the material through 12-foot spray bars.

Forms were pulled with the winch of a flat-bed form-transfer truck after the form pins were extracted by a hand puller. Special care was used to prevent the abuse of steel forms so they would last as long as possible and lay up easily. The forms were cleaned when they were set.

As finished, the new slab has a pulled-belt finish, with a final broom dressing. It is skidproof, and the engineers hope it will be long-lived.

Personnel

Field work on the Koss job was directed by young, energetic Al Beuerlein, General Superintendent and builder of the big bomber runways two years ago at the Roswell, N. Mex., Army Air Base. He was assisted by Lawrence Beuerlein, Base Superintendent; Glen Ryan, Fine-Grade Superintendent; I. G. Ness and C. O. Shope, Master Mechanics; Raymond Mulligan, Concrete Foreman; and Hap Hawkins, Batch-Plant Foreman.

The job was designed and supervised under the general direction of State Highway Engineer Carl W. Brown, with J. J. Corbett as Engineer of Construction and R. W. Hodson as Division Engineer. Orville Ratliff was the Resident Engineer.

Steam-Cleaning Equipment

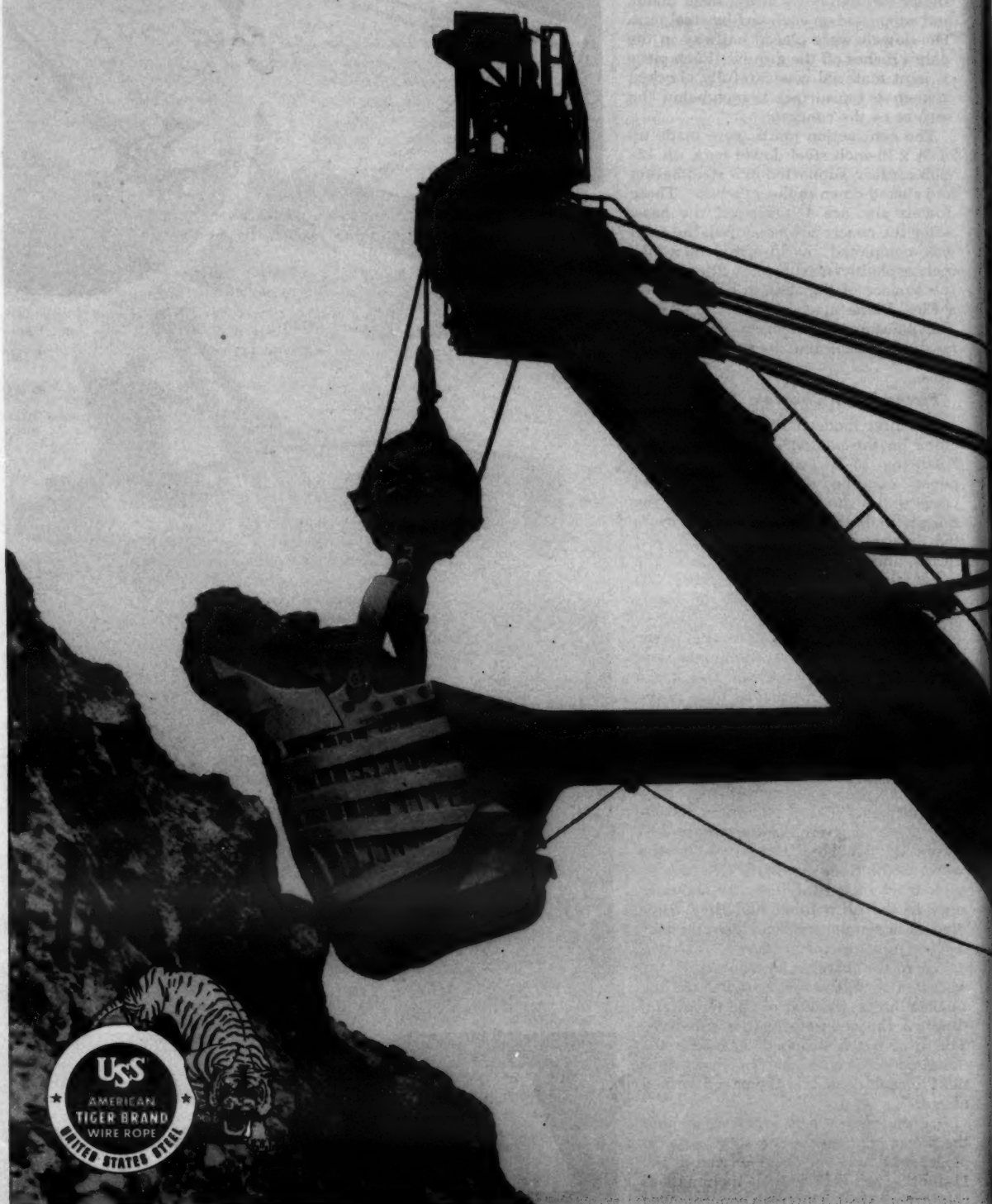
Equipment for high-pressure cleaning of construction machinery is described in a bulletin available from the Malsbary Mfg. Co., 845 92nd Ave., Oakland 3, Calif. Catalog No. 85 covers the 300 and 500 Series of Malsbary cleaners, featuring a 2-page list of their parts: heating coils, thermostat controls, pumps, burners, tanks, firebox, solution tank and distributor, spray guns, etc.

The catalog also explains general principles of operation, adjustments and controls, and specific operating characteristics of both the 300 and 500 Series. It tabulates specifications and dimensions for each unit, and pounds of impingement against the surface to be cleaned. It also cites a cost comparison for a typical steam-cleaning job, discusses several applications for which the Malsbary cleaners are recommended, and includes a section on choosing and installing the proper unit for each job.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 102.

At the Koss batch plant, set up on a spur line of the Wabash Railroad, a batch truck takes on cement from a Johnson Dutch Mill bulk-cement silo (photo at left). The cranes in the background, which are charging Johnson sand and aggregate bins, appear again in the close-up above. In the background is a Koehring, with a Northwest in front.

How the proper application of



A Snow-Free Road—Without Any Plowing!

The dream of every motorist and every highway engineer—a snow-melting highway—has been realized in the town of Klamath Falls, Oreg. A stretch of all-weather heated pavement has been opened for use on the Dalles-California Highway leading into Klamath Falls from the north. The road passes under the Southern Pacific Railway viaduct, and a few hundred feet farther crosses an irrigation ditch, thus necessitating a grade of 8 per cent—2 or 3 per cent steeper than would normally be used. It is four lanes wide and 450 feet long.

A unique feature of this application of radiant heating to a public road is that the hot water to be circulated through the pipes is heated by a natural hot-water spring. Work was started on the road after a 10-inch well which had been drilled struck a good flow of hot water at 390 feet. G. S. Paxson, Bridge Engineer for the Oregon State High-



A. M. Byers Co. Photo

These wrought-iron pipe coils will keep a steep stretch of highway in Klamath Falls, Oreg., clear of ice and snow this winter. Water heated in a natural spring circulates through the pipes which are embedded in the pavement slab.

way Commission, is credited with developing the idea.

The hot well water itself is not run through the roadway piping. Instead, a coil of 2-inch pipe is submerged deep in the well water, which has an average temperature of 190 degrees. A pump

sends water and an anti-freeze solution through the coil where it is heated or re-heated to not less than 160 degrees. A 2-inch pipe runs from the well to the pavement, and then parallel to the road for a distance of about 400 feet. About 15,000 feet of ¾-inch wrought-iron

pipe is embedded in the pavement slab. It is made up into grids for each of a series of 30-foot road panels. Each of the 15 panels is connected with the 2-inch water main by valves. The pipe was coated with asphalt before being laid. Wrought iron was used, the engineers explain, because of its resistance to corrosion and because its coefficient of expansion is nearly the same as that of concrete, thus keeping the bond and minimizing the danger of cracking the concrete.

The pump is thermostatically controlled and automatically begins to circulate the water when air temperature drops to freezing. It continues to operate until the temperature rises above the freezing point. Another pump draws water from the well, since it loses its heat value as the cool water flows from the road through the heat transfer coils. Hot water then bubbles up from the earth and replaces the water drawn out. Geologists believe that the water is heated either by hot underground lava or by chemical action.

Steam Hose Designed For Pile-Driver Use

An oil-resistant high-pressure steam hose for use with pile-driving equipment has been developed by the United States Rubber Co., Rockefeller Center, 1230 Avenue of the Americas, New York 20, N. Y. The hose is designed to withstand the deteriorating effects of a combination of steam and hot oil which occurs when lubrication is applied to pile-driving tools through steam-pressure lines.

The Matchless Pile Driver Hose consists of a rubber core covered with two or three plies of braided steel wire, a ply of asbestos cord, and a heat-resistant rubber cover. The braided-wire construction is said to provide the hose with a high bursting strength and to act as an armor against heavy external abuse.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 80.

Trencher Is Jeep-Mounted

A trenching attachment for use with the Willys Jeep is manufactured by Auburn Machine Works, Inc., 2023 Harney St., Omaha, Nebr., and a 4-page folder describing it has been issued by the company. It features a brief history of the development of the Jeep-A-Trench.

A large picture of the trencher mounted on a Jeep shows the diggers, chain drive, and other features. Specifications listed cover the bearings, universal joints, digger bits and elevators, speed, propulsion, etc. The folder also describes how the unit operates, the trench sizes it will drill, and how it is installed.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 126.

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The Pennsylvania Crusher Co. of Philadelphia has acquired exclusive manufacturing and sales rights in the eastern United States and Canada for the Kue-Ken line of jaw crushers and gyratory crushers. The Kue-Ken rights are owned by Straub Mfg. Co., Inc., of Oakland, Calif.

Pennsylvania Crusher will handle the Kue-Ken line in that section of the United States east of North and South Dakota, Nebraska, Kansas, Oklahoma, and Texas; in the Canadian provinces of Ontario, Quebec, New Brunswick, and Nova Scotia; in Newfoundland and Labrador; and throughout Puerto Rico. Both companies will operate in North and South Dakota, Nebraska, Kansas, Oklahoma, Wyoming, Colorado, and New Mexico.

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Connecticut River Bridge Completed on Schedule; Mobile Equipment Used On Concrete-Slab Work

By WILLIAM H. QUIRK,
Eastern Editor

THE new high-level bridge over the Connecticut River was completed last autumn according to schedule. A feature of the final phases of construction was the pouring of some 2,000 cubic yards of heavily reinforced concrete for the deck slab in just over a month's time. The bridge carries U. S. 1 from Old Saybrook, Conn., on the west side of the river to Old Lyme, Conn., on the east side. It is located about 2½ miles upstream from where the river empties into Long Island Sound.

Construction of the reinforced-concrete substructure—11 piers and 2 abutments—by Merritt-Chapman & Scott Corp., of New London, Conn., and New York City, was finished early in 1948. (See C. & E. M., June, 1948, pg. 1.) The plate-girder superstructure, designed for H-20 loading, S16-44, was completed by the American Bridge Co. of New York City in September, 1948. The \$2,000,000 superstructure contract also included pouring the concrete deck slab, but this part of the job was sublet to the Corbetta Construction Co., Inc., of New York City. Concreting began on September 30 and was finished on November 3.

The new span, 2,448 feet long measured center to center of bearings at the abutments, was built as a toll bridge by the Old Lyme-Old Saybrook Bridge Commission. Construction was supervised by the Connecticut State Highway Department. The new bridge replaces a low-level 37-year-old steel and wood structure containing a lift span for navigation. The old bridge carried only two lanes of traffic, while the new one accommodates four lanes on its dual 26-foot roadways separated by a raised 4-foot center mall. The roadways are made up of a 24-foot-wide reinforced-concrete slab of 7-inch uniform depth, with a 2-foot strip of open grid along the curb. On each side is a 3-foot concrete pedestrian walk, 5 inches thick.

A magnificent view may be had from the new bridge, since it boasts of a maximum vertical clearance of 83.3 feet above mean sea level. To the north is the broad expanse of the Connecticut River valley, while to the south lies the wide river mouth and the waters of the Sound. The bridge railing was carefully designed to permit motorists to enjoy this vista. The four cross pieces below the top pipe railing are placed far enough apart so as not to obstruct the vision. They are flat in shape, and are also slanted downward to the outside to conform with a plane taken from the motorist's eye level as he crosses the bridge. The total cost of the entire project is approximately \$6,500,000. This includes contracts for grading and paving of approaches, the relocation of U. S. 1 east of Old Lyme, grade separation and other bridge structures, toll facilities, etc.

Concrete Deck Slab

Work on the concrete deck slab began at the east abutment on the north roadway and proceeded to the west abutment. When that was finished, the south roadway was poured, also from east to west. The direction of the work was determined largely by two factors: the availability of a concrete batch plant on the east side of the river, and the fact that the high point of the

bridge was much closer to the east end than the west. The latter condition was governed, of course, by the river channel which flows between piers 8 and 9; the numbering of the eleven piers runs from west to east. The grade from each end of the bridge to the high point is 3 per cent. By working from the east end, the contractor minimized his uphill haul of both batches and mixed concrete. The degree of plasticity maintained in the concrete was such that the grade had no effect on it.

Enough lumber was ordered to construct deck-slab forms for the entire north roadway, and these forms were built well in advance of concrete operations. First, double 2x8 wales were strung across the roadway on from 4 to

(Continued on next page)

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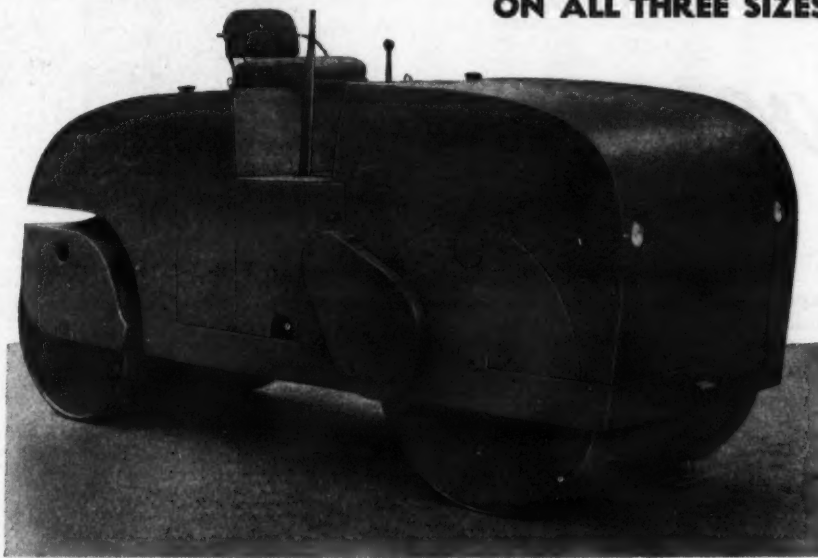
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Handles all asphalt, gravel or other rough surface jobs with remarkable ease at money-making speed. Works in corners, confined spaces and maneuvers easily in small areas with short 91" wheel base. With but 1½" of frame extension on left side it can work WITHIN 2 INCHES from buildings, fences, etc. To eliminate hand finishing, has 13¾" ground clearance to allow hair-line finishing when working along curbs and other raised side obstructions. SINGLE LEVER HYDRAULIC STEERING permits fast, tireless handling. Geared bull wheel provides positive power transmission and allows faster starts and stops. Other features: Foot operated Parking and Service Brake, Electric Starter, Turns in 12' circle, Low center of gravity, Free access to working parts. Easily transported, etc.

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POWER—Heavy Duty Industrial Engine—125 cu. in. piston displacement. 24.5 Brake Horsepower @ 1500 RPM; 27.8 Brake Horsepower @ 1800 RPM. Speeds: 2 forward and 2 reverse give 1.55 to 4 MPH range in either direction.
DIMENSIONS: Wheel Base 91". Length overall—132". Width overall—43". Tank height—57". Ground clearance—13¾". Left side clearance—1½". Right side clearance—3½".
ROLLERS: COMPACTION—Width—36". Diameter—40". Rolled and machined from ¾" stock.
STEERING—Width—38". Diameter—30". Rolled and machined from ¾" stock.
COMPRESSION—Per lineal inch: Compaction Roller—185 lbs. with ballast. Steering roller—75 lbs. with ballast.
WEIGHTS: Shipping weight (approximately) 6500 lbs. Maximum weight (with ballast) 10,000 lbs. Extra metal weight—400 lbs.

WHEELER TANDEM ROLLER 3 TO 4-TON VARIABLE WEIGHT

This is essentially the same in its sturdy construction and major operating features as the SEALCOAT Roller (above). Power specifications are identical. It is basically different in design and other minor specification differences given below.

MAJOR SPECIFICATIONS

DIMENSIONS: Wheel Base 7'10"; length overall 107"; width overall 36". Tank height 4'10". Ground clearance 10". Left side clearance 1½".
WEIGHTS: Shipping weight (approximately) 5500 lbs. Maximum Weight (with ballast) 8000 lbs. Extra metal weight 400 lbs.
COMPRESSION: Per Lineal Inch: Compaction roller, 150 lbs. with ballast. Steering roller, 70 lbs. with ballast.
ROLLERS: COMPACTION—Width—36". Diameter—37". Rolled from ¾" stock.
STEERING—Width—34". Diameter—37". Rolled from ¾" stock.
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5-foot centers. They were either carried on the bottom flanges of the steel stringers running between the 12-foot-high outside girders, or hung from the top members of the girders themselves by Richmond tie rods. The rod connectors, each shaped like a U, passed over the top plate of the girders to support a double wale on each side. The tie rods were easily adjusted to bring the wales to exact grade. Where the wales rested on the bottom flange of the stringers, wedges were inserted beneath them for any adjustments found to be necessary.

The wales supported 4 x 6 stringers, two to a bay, on from 4 to 5-foot centers. Across these were placed 3 x 4 joists on 14-inch centers to carry the 5/8-inch plywood on which the concrete deck was poured. Adjustments to grade height were effected by wedges, inserted between the bottom of the 4 x 6 stringers and the top of the double 2 x 8 wales. The plywood came in 4 x 8-foot panels.

Before any concrete was placed, a double tier of reinforcing rods was laid out on top of the forms. Carnegie-Illinois Steel Corp. supplied the reinforcing, which consisted of 5/8-inch transverse bars on 5-inch centers for both tiers, with 5/8-inch longitudinal bars in the bottom mat and 1/2-inch bars in the top mat. The longitudinal bars are on 12-inch spacing, except for 25 feet on each side of the piers where the spacing is reduced to 6 inches because of the negative moment of these continuous girders. The double mats are on 4-inch vertical centers.

Two-Yard Batches

The Corbetta Construction Co. used the batch plant of the Savin Construction Corp. which was located on the east side of the river about 1 1/2 miles from the bridge. The latter contractor had set up the plant for the construction of a grade-separation structure on the project. Sand, stone, and cement were shipped in by rail to the New Haven Railroad siding at Old Lyme, and hauled by truck the short distance to the batch plant.

Two sizes of stone for the coarse aggregate were obtained from the New Haven Trap Rock Co. at North Branford, Conn. Sand was supplied by the Certified Sand Co. of Avon, Conn. Both natural cement and portland cement were used in the mix, and were delivered in bags by trucks directly to the mixer at the bridge. There the bags were cut open and emptied into the skip by hand. Snyder's Rosendale natural cement was furnished by the Century Mfg. Co., Inc., of Rosendale, N. Y., while the Atlas Portland Cement Co. of Hudson, N. Y., supplied the portland cement.

Up to five batch trucks hauled the aggregate, holding either one or two batches according to the size of the truck. The weights of a typical 14-bag 2-yard batch of Class A concrete were as follows:

Portland cement—12 bags	1,128 lbs.
Natural cement—2 bags	188 lbs.
Sand	2,460 lbs.
Stone, 3/4-inch	1,570 lbs.
Stone, 1 1/4-inch	2,940 lbs.
Water	60 gals.

Mixing and Placing Concrete

The batches were mixed in a 2-yard Mixermobile which was first set up at the east end of the bridge. Corbetta Construction Co., Inc., brought this mobile unit up to Connecticut from New York City under its own power, over the highway. The 40-foot tower with which it is equipped was lowered for the trip. A 100-foot tower can be erected for use with this machine, but for this work the 1-yard hoist bucket had to be raised only about 12 feet to dump into the 1 1/4-yard hopper from which the concrete was discharged.

As the batch trucks emptied out their contents of sand and stone into the skip of the Mixermobile, the natural cement and portland cement were added. The loaded skip was then pulled up a short

incline and dumped into the mixer drum while water was added. The brackish waters of the Connecticut River could not be used for concrete, so fresh water was obtained from a 28-foot well that had been dug by the sub-structure contractor on the west side of the bridge. From the well the water was pumped by an electric-driven Motor-pump into a 7,000-gallon storage tank. From there it was forced by a Domestic 3-inch pump through a 2-inch pipe line that was carried along on the north railing of the bridge. The pipe was equipped with tees and plugs at 30-foot intervals. Batches were mixed for 2 minutes.

The concrete was transported from the Mixermobile to the forms by a fleet of five Whiteman Power Buggies, self-propelled little vehicles driven by an operator who rides on the machine. The stock buggy has a 12-cubic-foot-capacity body, and its Gladden 7 1/2-hp engine enables it to roll along at a speed of from 10 to 12 mph. For this

(Continued on next page)



C. & E. M. Photo

A Mixermobile discharges concrete into a Whiteman Power Buggy on the Corbetta Construction Co. bridge job in Connecticut.



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Connecticut Highway Department Photos

The workman at left hangs double 2 x 8 wales by Richmond tie rods from the top girder member of the new high-level bridge over the Connecticut River. Wedges shore the wales up to correct grade. Above is a view of concrete operations looking west over the north roadway. A Whiteman Power Buggy rolls along the center runway.

Self-Powered Buggies Speed Up Deck Pours

(Continued from preceding page)

job the contractor welded an extension to the body to increase its capacity to 13 or 14 cubic feet. The gear ratio was also advanced, thereby increasing the buggy speed to as much as 18 mph. Built with an aluminum-alloy frame, the buggy has a total weight of 660 pounds and moves on 6 small rubber-tired wheels—4 in front and 2 in back. It can spin around through 360 degrees and is equipped with an automatic clutch and shifting device. The concrete was discharged from the buggy by a controlled rack dump.

Operate on Runway

For pouring the first or north lane, a runway was constructed along the center line of the bridge and the buggies operated over this. The 4-foot-wide open-grid center mall was utilized, and a wooden strip was added to it along the south side to produce a 6-foot-wide runway. The long timber platform was supported on the structural-steel stringers, and was supplied with turnouts for passing. On the south, or open side, it was protected by a sturdy guardrail.

After the work had progressed from the east abutment to a point about half-way out on the north lane, the Mixermobile was moved out on the concrete about 800 feet from the east end. Thus for the rest of the concreting on that lane the buggies rolled downgrade with a full load and went back up the grade empty. While working on the concrete, the Mixermobile operated off a mat made of 3-inch plank to protect the new deck slab. When the north roadway was completed, the Mixermobile moved back to the east abutment for the start of the south roadway. The center runway was no longer needed since the buggies now had the entire north half of the bridge to roll on, so the wooden structure was dismantled. Again on the south roadway after the high point of the bridge had been reached and passed, the Mixermobile was moved out on the north lane to reduce the length of haul for the buggies, and to enable them to move downgrade when loaded.

During the placing of the concrete in the forms, a crew took up position beneath the bridge deck to hose off any concrete grout or drippings that might fall on the steel or substructure. Crew members worked either from the permanent catwalk that runs beneath the steel, or from wooden platforms hung from the superstructure. Their hoses were connected to the pipe line on top of the bridge. The concrete that they washed off usually dropped through the open grid between the concrete deck slab and the sidewalk.

(Concluded on next page)

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Concrete Finishing

The loaded buggies discharged the concrete from a dumping platform into the forms. This dumping platform consisted of a well built 4-wheel bridge that spanned the complete roadway. It had a wheelbase of 13 feet, with a wooden plank floor supported on I-beams, yet it was light enough to be pushed ahead easily by hand. It rolled along on the curb of the center mall on one side, and the open grid along the sidewalk on the other. Wedges held the wheels in position until it was necessary to move the platform. The easily maneuvered buggies ran out on the platform, dumped their load of concrete over the side, and then scooted back to the Mixermobile for another load.

As the concrete was placed it was vibrated by Mall and Master spud-type vibrators. It was then struck off and finished with a Heltzel Flex-Plane single-screed finisher which made two passes—the first at low speed and the second at high speed. Behind the



C. & E. M. Photo

Two Whiteman Power Buggies dump concrete for a deck pour on the Old Lyme-Old Saybrook bridge. A fleet of five buggies worked on the job.

mechanical finisher came a 4-wheel bridge which supported a longitudinal bullfloat, 10 feet long and worked by hand. The surface was then carefully checked with a 10-foot long-handle aluminum Cleveland straight-edge. A 3-foot-long strip of burlap, extending the width of the slab, was next pulled over the concrete to remove any surface moisture. After the concrete had set up slightly, the surface was lightly roughened by a fiber broom pulled across the slab. This was done from another 4-wheel bridge.

When the concrete had hardened slightly, the surface was covered with burlap, which was then saturated with water and kept that way for a 5-day curing period. The only joints that went into the concrete were construction joints at the end of the day's pour.

The north roadway was done in eleven separate pouring operations, the longest of which covered 290 linear feet. The south roadway was done in faster time, requiring only 7 days, and would have been completed in 6 pours if there had not been a shortage of reinforcing steel. The best day saw 305 cubic yards of concrete placed within 8 hours, to account for 530 linear feet of 24-foot slab, 7 inches thick. On the south roadway the buggies operated over the completed north half of the bridge; this naturally speeded up the operations.

For removing the forms Corbetta used stripping platforms which were suspended beneath the bridge on cables hung from the girders and stringers. At the bottom of the cables trolley wheels were attached, and these in turn were framed into I-beams. A platform was made up of three such I-beams from 15 to 20 feet long, and running lengthwise of the bridge. Connecting the bottom flanges of the I-beams were 6 x 6's, spaced 3 to 4 feet apart, which supported a 2-inch deck for the stripping platform. Turnbuckles on the cables permitted vertical adjustments. As the stripping advanced, the platform was moved ahead by hanging more cables and sliding the I-beams along on the trolleys.

Personnel

The deck slab required 2,900 cubic yards of concrete and 900,000 pounds of reinforcing steel. A force of about 100 men was employed on the deck work by the Corbetta Construction Co., Inc., under the supervision of Bob Chamberlin, Superintendent.

For the Connecticut State Highway Department, Colonel Howard S. Ives is Project Engineer. Karl Dworak was Chief Inspector on the superstructure contract. The Department is headed by G. A. Hill, State Highway Commissioner, with R. E. Jorgensen, Deputy Commissioner and Chief Engineer. Warren M. Creamer is Director of Engineering and Construction, with M. A. Tyack, Engineer of Contracts and Construction.

Line of Contractors' Pumps

Self-priming centrifugal pumps are the subject of a 16-page bulletin issued by The Gorman-Rupp Co. of Mansfield, Ohio. Feature of the bulletin is a series of "X-ray" pictures of the priming action which show what goes on inside the pump when it is in operation. Pumps listed in Gorman-Rupp Bulletin No. 8CP-11 range in size from the 7M 2-inch model to the 125M 8-inch.

A section of the catalog tells how to select the correct size of pump for a specific job. Engineering data designed to aid the contractor in solving his pumping problems are included, along with tables to assist in figuring pumping requirements. Each pump is illustrated in the catalog, and text accompanying the photograph lists the unit's features, specifications, and rating.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 116.

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Above, a loaded Euclid roars down a high fill on the Gibbons & Reed railroad-relocation job at Boysen Dam. At right, a C. B. & Q. locomotive spreads a carload of ballast ahead of a rail-laying gang tamping ties. Boyce Kershaw is doing trackwork on the completed grading.



Railroad Relocated Around Boysen Dam

(Continued from page 2)

handled by the U. S. Bureau of Reclamation, technical advice and inspections are also being furnished by the engineering department of the C. B. & Q. Railroad Co.

Grading Job Is Big

The 14-mile railroad job by Gibbons & Reed involves a combination of materials. Sandstone, siltstone, diorite, conglomerate, boulders, and earth are all found in the job. This came as no surprise to Gibbons & Reed, however, for during the 1947 work season the company relocated U. S. 20 through the same high country near the dam. That job, on which some 300-foot cuts were made, gave the foremen and operators a real look at what the present railroad job would be like.

And they have not been disappointed. To pioneer one cut, men worked two whole days to get the first bulldozer up to the top. When it got there it had only a few feet in which it could move. It teetered precariously back and forth for five hours, finally scooping off enough dirt and conglomerate to start the deep cut at that point.



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A. V. Toolson, General Superintendent for Gibbons & Reed, grinned as he explained the situation. "All the cuts had one thing in common. All are 34 feet wide at the bottom. But some come

close to being a mile wide at the top," he exaggerated, to illustrate what tremendous excavations were necessary.

The new roadbed is to have a bottom-of-cut width of 34 feet, with 1½ to 1

side slopes through much of the material. Slopes were steeper in some of the siltstone, to reduce the exposed area vulnerable to rains. Fill sections varied

(Continued on next page)



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somewhat, and there arose the problem of cramped working space. Cuts were anything up to 160 feet deep, measured vertically at the center line. The job was so rough and rocky that eight D8 final-drive casings split wide open in eleven months, some beyond repair.

Equipment

The equipment fleet centered around two main spreads. A Northwest 80-D shovel with from 6 to 9 end-dump Euclids was used in one set-up. A 54-inch Euclid loader with 7 bottom-dump 13-yard Euclid wagons comprised the second spread. A Model 70 Northwest shovel was also used to some extent, as was a small Bucyrus-Erie 15-B ½-yard dragline, which was employed on miscellaneous jobs such as setting culvert pipe.

Four Super C Tournapulls were used for several months on some spectacular 50-degree slopes. The tractor fleet included 15 Caterpillar D8's, 4 of which were used to power the 4 Caterpillar earth-moving scrapers on the job. The rest, equipped mostly with bulldozer blades, were used for hundreds of spreading, pushing, and pioneering jobs throughout the project.

Where hard rock was found, spot shooting was necessary. Portable compressors on the Gibbons & Reed job consisted of an Ingersoll-Rand, 2 Chicago Pneumatics, and a Gardner-Denver, all in the 365-cfm class. Ingersoll-Rand and Gardner-Denver pneumatic drills and several wagon drills of the same makes were also used.

The brunt of hard work on grading, however, was not borne by drilling equipment and explosives. Toughest punishment of all went out to several Caterpillar and LeTourneau rippers. Fully 75 per cent of the big job was ripper work, and these machines were not spared. In siltstone, particularly, ripping produced even better break-up results than were possible with powder. The rippers were often stripped down to one big tooth, with two D8 pull cats hooked in front and a D8 pusher, behind. Smoke curled up out of the hard formation at the ripper tooth, the tractor engines roared, and the siltstone broke up in chunks.

Siltstone, incidentally, is a peculiar formation. It is light gray in color, and hard enough under the surface to ring when hit with a hammer. Yet when the surface of this hard formation is exposed to rainfall, it dissolves readily. Put a piece of siltstone in your mouth, chew it until it dissolves to paste, and you seldom feel any gritty particles.

On account of the problem of vulnerability to rainfall, though, engineers of the USBR and the railroad felt it necessary to widen the roadbed in cuts to 34 feet, which was somewhat greater than originally planned. This provision will make it possible for maintenance crews to clean up any material which sloughs away.

Embankment Fill

The processing of railroad fills marks what many engineers believe is a trend towards higher-type embankments under railroad tracks. The native ground was sampled all along the 14-mile relocation line. Soils were classified and natural densities taken. Then, in building the new embankment, mechanical densities at least 10 per cent greater than the natural densities of undisturbed ground near-by were obtained by thorough watering, processing, and rolling with sheepfoot rollers.

Over 25,000,000 gallons of water were used in the railroad embankment. Several pump and reservoir stations were located strategically along the Big Horn River, and four 2,000-gallon water-tank trucks with gravity-type feed bars hauled the moisture to the fills. The dirt was laid down in 6 to 8-inch lifts, watered, leveled by bulldozers or the

4 Caterpillar No. 12 motor graders on the job, and then rolled.

Dirt output was enormous. For example, on many a good day when work was proceeding at top speed, the 54-inch Euclid loader sent 100 loads of 13 yards each to the fill each hour it operated. There were many 700-load shifts.

Also, the loader operated successfully in broken siltstone and conglomerate, although ordinarily it was not subjected to this kind of punishment. Wherever possible it was put in earth borrow, where the sharp stones would not be present to cut the conveyor belt to shreds.

Equipment Upkeep

The upkeep of this equipment fleet consists primarily of the replacement

of worn-out parts, and the major overhaul of engines. One General Motors diesel from one of the Euclids was torn down the day the job was visited. It had 2,173 running hours chalked up on the elaborate card-index file in the Gibbons & Reed office before overhaul was necessary. Under the grueling punishment all but one top piston ring had broken, and most of them had ended up in the breather intake to cause trouble.

Repair facilities for Gibbons & Reed are located in the main Morrison-Knudsen camp area, in a 45 x 90-foot Quonset frame with metal doors and canvas covering. Last winter when equipment worked outside in one big cut at 31 degrees below zero, this shop did a land-office business. The

equipment operated 24 hours a day, however, to keep the engines turning over, to get rid of a deep and troublesome siltstone cut, and to give good key operators a chance to work steadily through the winter.

Shop equipment consists only of mechanic's tools—3 Yale heavy-duty hoists, a Wilson 75-ton hydraulic press, a Sioux valve refacer, and complete welding equipment. More than once a rush job has been done for Gibbons & Reed in the M-K shop near by, where lathes are located. "They helped us out of a few spots more than once," Master Mechanic Lewis Nielsen said.

Embankment Topping

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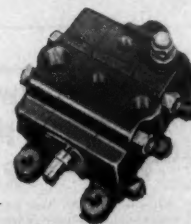


Vickers Improved Hydraulic Steering Booster with integral overload relief valve. See Bulletin 47-30a.



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Railroad Relocated Around Boysen Dam

(Continued from preceding page)

road embankment was built of select granular material, carefully processed and rolled. This material was designed as a base under the ballast cushion to follow.

Under the Royce Kershaw contract, railroad ballast was trucked in from a gravel separation plant operated and owned by the prime contractor. This plant consists of a Pioneer feeder, 150 feet of 24-inch conveyor to a set of separation screens, a set of Telsmith sand scrubbers, and a Cedarapids 20 x 36 jaw crusher.

Railroad engineers insist on at least 50 per cent of crushed material in the track ballast, so the jaw crusher is being used to a considerable extent in breaking the material down to the minus-1½-inch size required.

Material for this plant comes from a 1½-mile radius from pit-run deposits of conglomerate. The material is loaded by a Northwest 6 shovel to five Koehring Dumpsters, and hauled to the feeder. About 600 cubic yards of ballast and whatever concrete aggregates are needed are being produced each day by the plant. The pit is running very high in fines, so a big stockpile of sand is growing as the work proceeds.

The Kershaw crews dump the ballast from trucks according to the calculated volume per station, and spread the material with a bulldozer blade. To get the ballast the proper thickness, grading guides in the form of heavy steel shoes were attached to skim the ground under the bulldozer blade. Final finishing is done by a motor grader.

Ties, rails, and occasional extra cars of ballast are being scattered over the job by work trains of the Burlington, operating largely from the existing railroad track where it is accessible to the new job. Near one of the existing tunnel portals a temporary shoo-fly had to be built to carry trains while the new fill was being constructed there.

The work on ballast, ties, and rails is being done by colored crews of gandydancers.

Railroad Bridges

Not a small part of the new railroad relocation is the construction of six concrete and steel bridges, which will carry the railroad across several dry streams and across the Big Horn River. Structure excavation and backfill as well as concrete forming and pouring for these bridges are being done by the main contractor, and structural-steel erection will be done later by American Bridge Co.

All form work is done in the Morrison-Knudsen carpenter shop, and fitted in the field. Local pine and spruce lumber is being used. In general, 4 x 6 uprights carry the form bolt ties, and 2 x 8 and 3 x 8-inch timbers on 15-inch centers serve as wales. Ordinary ¾-inch shiplap lumber is used for the form facing. Nails are countersunk and the forms are sanded before they are hauled out to the field.

The carpenter shop in which this



C. & E. M. Photo

Not a small part of the railroad-relocation job at Boysen Dam is the construction of six concrete and steel bridges to carry the new railroad over several dry streams and the Big Horn River. Here carpenters are setting up pier forms for bridge construction.

work is done is a 40 x 100-foot steel Quonset hut with a concrete floor. Power machinery there includes a Thor

sander, a DeWalt power rip saw, an Oliver band saw, and a Monarch wood-working machine.

When the forms are set in place and adjusted to line and grade, ½-inch steel rods are used to secure the panels. These rods remain in place in the concrete, and the cone holes are filled with dry cement patching after the forms are stripped.

Two of the bridges have required the use of concrete bearing piles, which have been cast on the job and driven by a crane and pile hammer. Pouring has been done with agitator trucks hauling the wet concrete from the batch plant, and transferring it to 2-yard Blaw-Knox buckets on the job. The buckets have been hoisted to the pours by a Bucyrus-Erie 54-B crane.

The complete job, including work performed by the two subcontractors, will make a fast new roadbed from a point about 3 miles north of Bonneville, Wyo., at milepost 306.92, to Boysen, at milepost 319.5. Viewed as a whole, the new relocation will also include the tunnels, three tunnel ventilating-fan houses, and various pedestrian and signal-machine turnouts.

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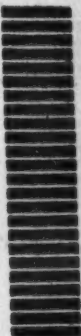
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Pre-Stressed-Concrete Digesters Feature of Big New Sewage Plant

Huge Tanks at Hyperion Activated Sludge Plant Poured and Strengthened By Unorthodox Methods

+ SPECIAL construction equipment, unique engineering design, and a departure from usual methods of construction are all featured on a contract to build for the City of Los Angeles the Hyperion Activated Sludge Plant, along the Pacific Ocean near El Segundo, Calif.

Construction of the mile-long outfall pipe line out to sea was dramatic and daring. (See C. & E. M., February, 1948, pg. 1.) Excavation of millions of yards of sand to make room for the big sewage-treatment plant was different, to say the least, since it was done by the Sensibar method. (See C. & E. M., May, 1948, pg. 40.) Today, "different" methods still apply at El Segundo, with the construction of 18 reinforced-concrete digester tanks, each capable of holding 2,500,000 gallons. Each tank is being pre-stressed by the Preload method, which calls for the application of about 1,300 wraps of steel wire under a strain of 140,000 psi; the wire is then covered with Jetcrete.

The work began April 12, 1948, and is expected to be finished by March of 1949. Pacific Bridge Co. of San Francisco has the \$3,989,000 contract with the City of Los Angeles. It includes the 18 digester tanks, small control buildings, a transformer building, and interconnecting pipe tunnels.

The principal subcontractors on the job include Newbery Electric Corp. of Los Angeles, which has all electrical work; Rutherford & Skoubye on steel reinforcing; and two firms in combination, the Ofeco Co. and Pacific Pipeline & Engineers, Ltd., which are installing piping and machinery connected with the contract.

Digester Tanks Are Big

The 18 tanks are identical except for the location of electrical and piping fixtures. Each has an inside diameter of 110 feet 11 inches, with a wall thickness of 20½ inches. Floor slabs of the tanks are 8 inches thick, and are so shaped that the base of the digester rests on an inverted cone-shaped sand foundation.

The reinforced-concrete domes above the tanks are 5 inches thick. The tanks are 34 feet high at the walls and 65 feet high from the bottom of the cone at the center point to the top of the dome. They are designed to work under the normal dead load of sewage plus 10 inches of water-column gas pressure.

Concrete construction is all monolithic, except for a key 4 inches deep in the digester foundation. This key is painted with emulsified asphalt to permit movement of the concrete walls when pre-stress wire is applied.

Construction of the 18 tanks poses some relatively large construction quantities. It involves about 30,000 cubic yards of concrete, 140,000 cubic yards of excavation, 3,218,000 pounds of reinforcing steel, and 280,000 pounds of structural steel, plus electrical work and piping.

Unusual Methods Highlight Job

Pacific Bridge Co. is using many special methods to get the work done quickly. A special trimming machine, patterned somewhat along the lines of irrigation-canal trimmers, has been made up to shape the inverted-cone bottoms of the digester floors. Great steel forms, which can be used in pouring one-fourth of a digester wall at once, are prominent on the job. A prin-

cipal feature of these forms, which are exceptionally stable, is the use of steel trusses for the conventional upright members of the panels.

Another special system of steel supports, resting on a center steel tower and side-wall notches, is being used to hold up the dome forms during the pour. The members, which are reminiscent of steel ribs in an umbrella, are assembled by a gantry-mounted crane on each pour.

The Preload design of drawn wire around the digesters, rather than a system of rods and turnbuckles ordinarily used, has called for the creation of a new machine to be described a little later. This is the same machine which was used with such success at

(Continued on next page)

Hyperion Sludge Plant To Handle 420 MGD in Storm Peaks; Fertilizer To Be Produced and Sold

+ THE Hyperion Activated Sludge Plant being built for the City of Los Angeles near El Segundo, Calif., will serve a total estimated population of 3,000,000 persons. The plant is designed for an estimated input of 82 gallons per capita per day, and will thus have to handle about 245 mgd in average dry weather.

In peak dry weather the flow will be 350 mgd, while during the winter storm peaks the total flow into the big plant is estimated at 420 mgd, or 650 cubic feet a second.



C. & E. M. Photo
A Colby crane handles 13-ton sections of wall forms for a digester tank.

The sewage to be treated comes from Los Angeles and its adjacent cities. It (Concluded on page 97)

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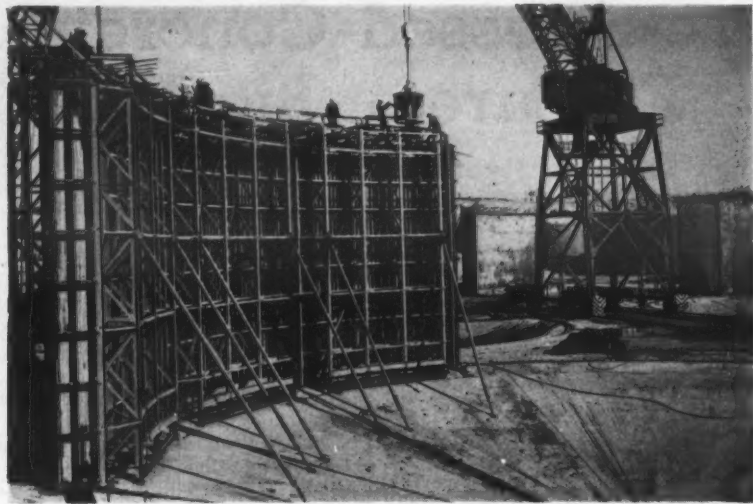
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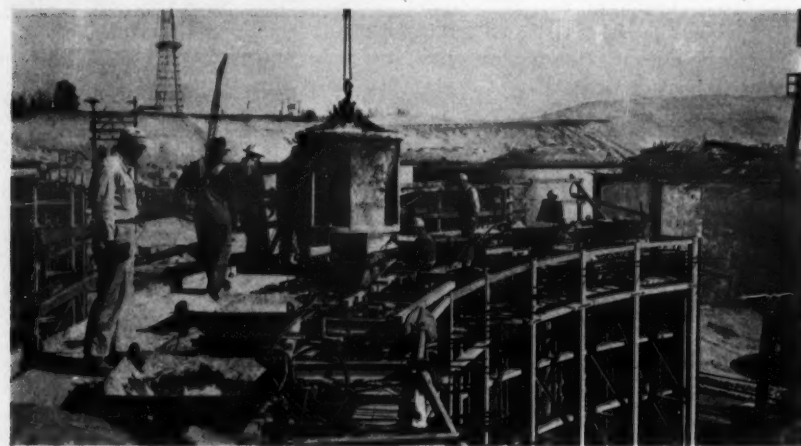
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TANK FOUNDATIONS. The reinforced-concrete digester tanks which Pacific Bridge Co. is building at the Hyperion Activated Sludge Plant near El Segundo, Calif., rest on these cone-shaped sand foundations. Heavy footing rings to carry the tank walls are poured first, then the floor slabs.



WALL FORMS. For wall pours, intricate steel forms are set up three panels at a time to contain the concrete of one-fourth of each digester wall. A Colby crane on a 50-foot-high gantry frame handles the 13-ton panels. Each wall pour contains about 200 cubic yards of concrete.



WALL POUR. The concrete is built up inside the wall forms by dumping each bucket load down a line of Gar-Bro hoppers and metal elephant-trunk sections. The Colby crane swings the Gar-Bro bucket to the top of the forms.



ROOF FORMS. Here workmen use shiplap lumber to face the form for a dome roof pour on a digester tank.

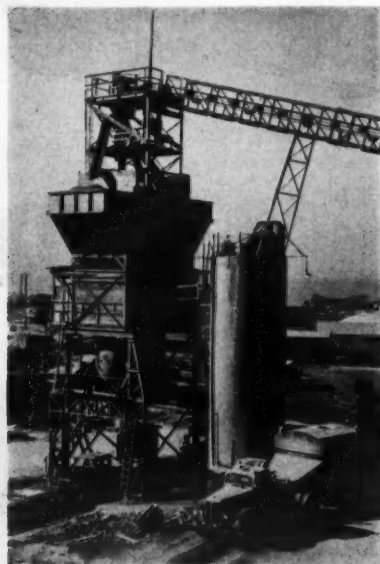
Concrete Digesters For New Sewage Plant

(Continued from preceding page)

Grand Coulee, Wash., in the summer of 1948, to build a water-storage reservoir tank for the city.

Credit for originating many of these unorthodox but effective methods must go to the Pacific Bridge Co., and the company has picked two of its top-notch builders to supervise the use of them in the field. Charles D. Bisordi, the General Superintendent, is young but capable. He was one of the men

(C. & E. M. and Pacific Bridge Co. Photos)



BATCH PLANT. This Conveyco batch plant, specially built, is handling all concrete materials on the big job.

who directed salvage operations on the wrecked battleships at Pearl Harbor, and righted the ship Oklahoma after Japanese bombs turned the big battlewagon topsy-turvy in the mud.

The Project Engineer is Stanley Kimball. Like Bisordi, he too has an enviable background of heavy experience. Quietly and unobtrusively he helps to keep the job moving along in a straight line. So now let's take a tour and see this big construction job as Bisordi and Kimball see it, from the start to the finish.

Tank Floors Built

The first big job, of course, is excavation. Sluicing operations of Peter Kiewit Sons Co. and Construction Aggregates Corp., contractors who removed the vast sand dunes at the plant site, left the area reasonably close to final grade. Compared to the 14,000,000 yards in their contract, the 140,000 cubic yards in this one is mighty small.

However, it is slower work, and more precise. To rough it in, they use a fleet of seven tractors and scrapers which dispose of the material in a big stockpile, where it can be hauled back in later. Eventually the big digester tanks will be backfilled with sand to a point about three-quarters of the way up.

In the meantime, a batch plant is set up. It is a special plant made by The Conveyor Co. to Pacific Bridge specifications. It consists of a 600-barrel bulk-cement silo, a 4-bin batch plant for sand and aggregates, a feeder hopper and tunnel, and 180 feet of conveyor which lifts the aggregates to the plant.

Arrangements are made to buy Riverside portland cement f.o.b. the plant, and a trucking contract is entered into. Soon the first trucks arrive and discharge the cement to a ground hopper

(Continued on next page)



PRE-STRESSING. Finally, each tank is pre-stressed by the Preload method—about 1,300 wraps of steel wire are applied under a strain of 140,000 psi by the winding rig shown here.



OVERALL VIEW. Here is a view of the \$3,989,000 project for the City of Los Angeles, showing some of the 18 tanks completed and some in various stages of wall and dome pours.

where the Conveyco cement lift can pick it up and store it in the silo.

Sand and aggregate, too, has to be arranged. It comes from the Consolidated Rock Products Co. plant about 45 miles away, and Consolidated delivers it right to the job, dumping the material in stockpiles near the tunnel. From that point to the conveyor belt, a Caterpillar D8-mounted bulldozer handles the stuff easily. Large-sized aggregate goes in two of the plant bins, while sand and pea gravel go in the others. Cement and water functions of this Conveyco plant are fully automatic, and the aggregate batching is manual.

By the time the plant is set up and operating, the scrapers have finished grading around several of the tanks. A bulldozer then roughs the base in—some bases were actually done while the scrapers worked—to within about a foot of grade. Grade stakes are then set for the first concrete pour: in this case the heavy footing ring which will carry the digester walls. This ring is formed by plywood-faced forms which will be used over and over until all 18 base rings are poured.

The place by this time is alive with activity. Other crews are laying railroad tracks and setting up two big Colby 200 gantry cranes with 120-foot booms. These powerful lazy-looking giants are able to reach all the way across most of the tanks simply by shifting their tracks around occasionally. For the few places they can't reach, Bisordi gets a Lima crawler crane, and a Link-Belt Speeder truck crane also comes in handy.

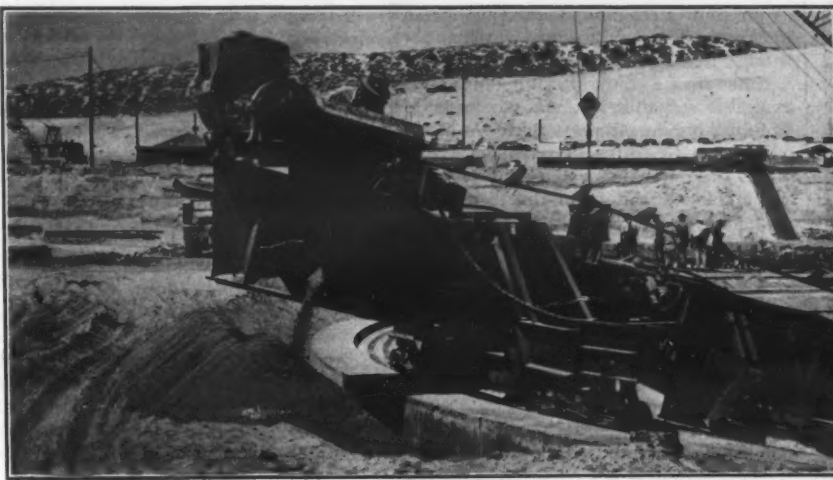
The first footing ring is formed, the steel is in, and the job is ready for its first concrete. The batch plant mixes the concrete, after it has proportioned the batch, by dumping it down the throat of a 2-yard Koehring tilting mixer on a platform below the weigh hopper. Flat-bed trucks take the mixed concrete in 2-yard Gar-Bro transfer buckets, and haul it out to the job. One of the big gantry-mounted Colbys reaches out, picks it up, and swings it over to the pour where men can trip the bucket.

Now the base is ready for the special trimming machine. The machine consists of a long steel I-beam, one end of which rests at the center of the base in a stationary manner. The other end rests on a traveling truck with rubber-tired wheels, which travels around the tank perimeter in the key-way of the base ring.

A steel cutting or strike-off screed and an endless chain of cutting buckets are rigged on the forward side of this machine. The bucket chain is driven by a Wisconsin gasoline engine, which can be engaged or disengaged through a Rockford clutch and a gear-reduction box. Forward travel of the machine is assured by a small air hoist chain connected to the drive wheels.

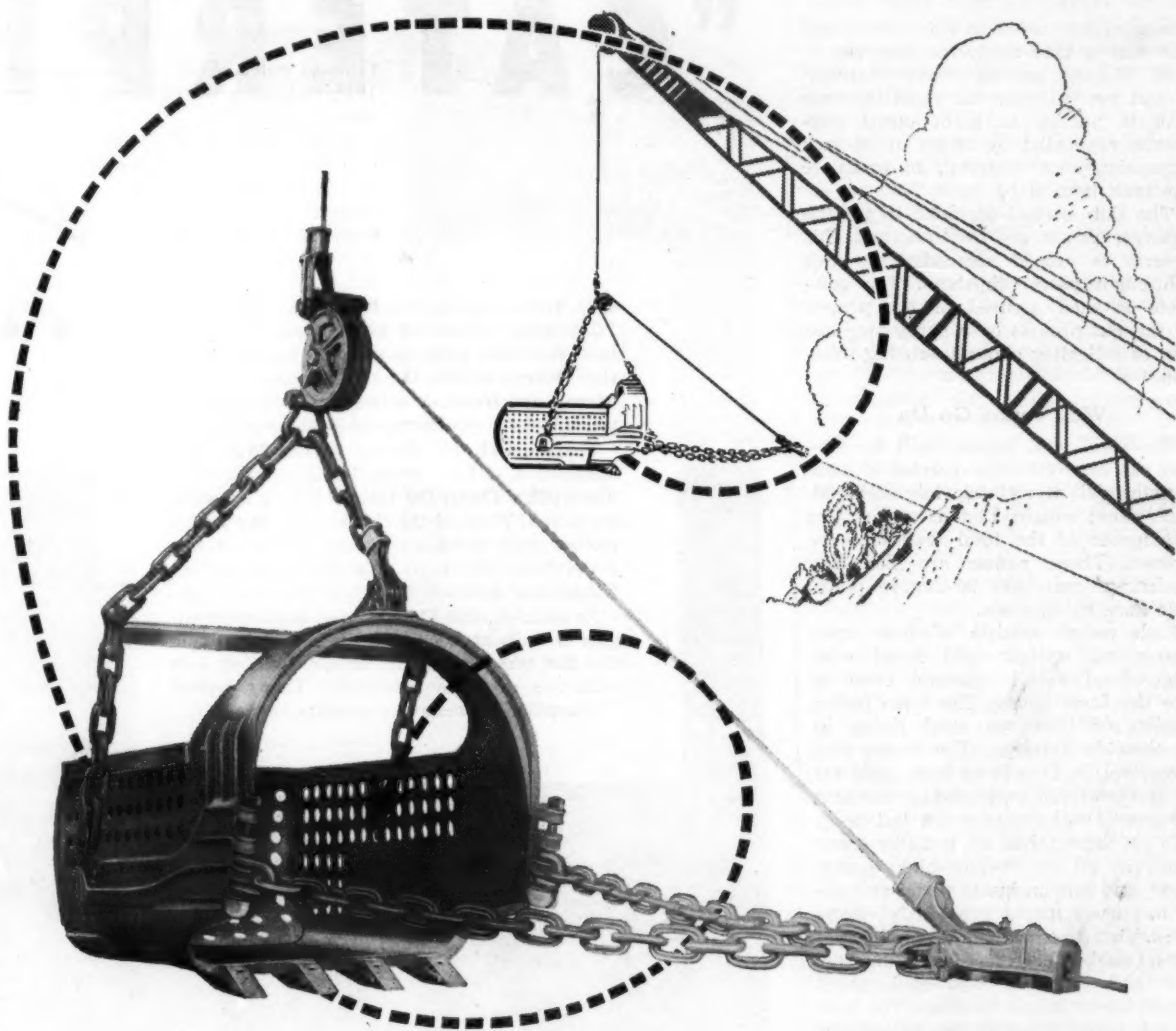
Made up in Pacific Bridge Co.'s Alameda yard, this rig can be moved easily from one tank to another by one of the gantry cranes. It fine-grades the base of the tanks in just a few hours, throwing the excess dirt outside the foundation ring where it can be smoothed down by a bulldozer. When the machine finishes and is lifted out, a minor amount of hand labor is required where

(Continued on next page)



Pacific Bridge Co. Photos

Special machines mark the construction of the Hyperion Activated Sludge Plant. Here are two views of the unit for trimming the footing rings which carry the digester tank walls. It consists of a long steel I-beam with one end resting at the center of the ring and the other resting on a rubber-tired truck which travels around the tank perimeter in the key-way of the base ring. A steel strike-off screed and an endless chain of cutting buckets are rigged on the forward side of this machine. Above is a view from the discharge end, and at right is a close-up of the screed and buckets.



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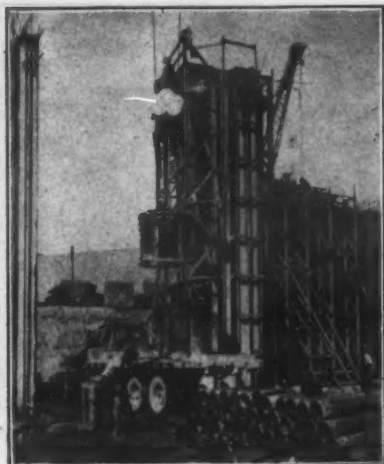
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C. & E. M. Photo
A workman cleans used elephant trunks, and a Gar-Bro bucket starts up to the wall pour, on the Hyperion sewage-plant job near El Segundo, Calif.

Concrete Digesters For New Sewage Plant

(Continued from preceding page)

the machine rested in the center, and the base is then ready for concrete.

A 20-foot-diameter center "button" is first poured, then the main concrete slab is poured in eight equal segments, separated by strips of ½-inch expansion-joint material, to complete the tank base slab.

The slab is steel-troweled to get the concrete dense and smooth, and this process is helped somewhat by two Whiteman power finishers. The concrete is then assured of the proper curing-out process by a spray application of a Sealtext concrete-curing solution.

Wall Forms Go Up

The steel wall forms, built to contain the concrete of a quarter of each digester wall, were intricately designed. Each panel weighs 13 tons and covers 30 degrees of the total wall circumference. Three panels are therefore needed to span the 90-degree pours which are being made.

Each panel consists of four open trusses set upright and faced with longitudinal 8-inch channel steel to take the form facing. The form facing consists of Irvington steel lining in 8-inch-wide sections. The forms also have steel bulkheads at both ends for the first pour, one bulkhead for the next two pours, and none for the last pour.

To set these forms up, a Colby crane comes in on its 50-foot-high gantry frame, and sets an inside panel according to survey marks previously established. Two pipe braces per panel fasten to steel anchor bolts left in the digester floor, and serve to hold each panel upright in the proper position. The base of each panel is set in the keyed slot in the concrete base. Three such inside panels are first set up and reinforcing steel is placed.

Three outside wall panels, similarly constructed, then are set up. Wooden wedges and blocks give the base braces a snug bearing. The forms are bolted only at three points: at the top, the mid-point, and the bottom. A row of 24 mild-steel form bolts 1½ inches in diameter secures the three panels at the top and bottom. The center row of bolts is of the same diameter, but is made from high-tensile-strength steel. These bolts are marked with red paint and kept separate in stripping or cleaning.

The form bolts have spreader cones which hold the forms the right distance apart, and heavy nuts snug them up the other way. When the forms are set and bolted, and the pipe braces tied down tight, the form is not likely to move. A series of piano-wire plumb lines with heavy weights, referenced to marks along the bottom, serve as a check during the pour, however. There is always

a possibility that a loaded concrete bucket could swing into a form, although this has not happened.

Nine inside tank form panels are available for this job, and six outside panels. This permits a pour to be made with a set of forms as often as every other day. When forms are stripped and moved ahead from the first pour, they are set ahead counterclockwise to pour the next three segments in order.

Reinforcing Steel "Prefabbed"

One of the features of the job is the prefabrication of steel reinforcement in panels. The steel for all slabs, footings, and walls is built up in this manner, on jigs in the Rutherford & Skoubye yard at the job. The panels, when completed, are lifted and handled by the Colbys or the Link-Belt Speeder truck crane.

To cope with a severe problem of electrolytic action, every piece of reinforcing steel in the job has to be welded to assure electrical continuity. Most of the welding is done in the yard, but some field welding is also necessary to tie the panels together. Each structure of the big sludge plant will then be tied by copper cables to a central ground connection in the control room.

A Wall Is Poured

Each wall pour contains about 200 cubic yards of concrete, and if the material moves out to the job at the optimum rate, a wall pour can be made in 6 hours. Kimball and Bisordi will let the boys pour 6 feet an hour, or about 34 cubic yards. They do not like to go above that for several reasons, the chief one being possible damage to the

forms. Besides, it's very hard to take care of much more than that, because placing and vibration are exacting.

The crew is composed of a foreman, a ground man to spot the trucks, a dumper to trip the big Gar-Bro buckets, three helpers for the vibrator men at the tops of the forms, and four vibrator men in the forms. This latter work is tough. The walls are only 20½ inches thick, and there are two mats of steel reinforcement inside the forms. The four men worm their way around somehow down in this steel, and it is so tough that the time office gives them an extra hour's pay each shift for their effort.

Eight Gar-Bro hoppers with metal elephant-trunk sections serve each pour. As the trucks arrive from the

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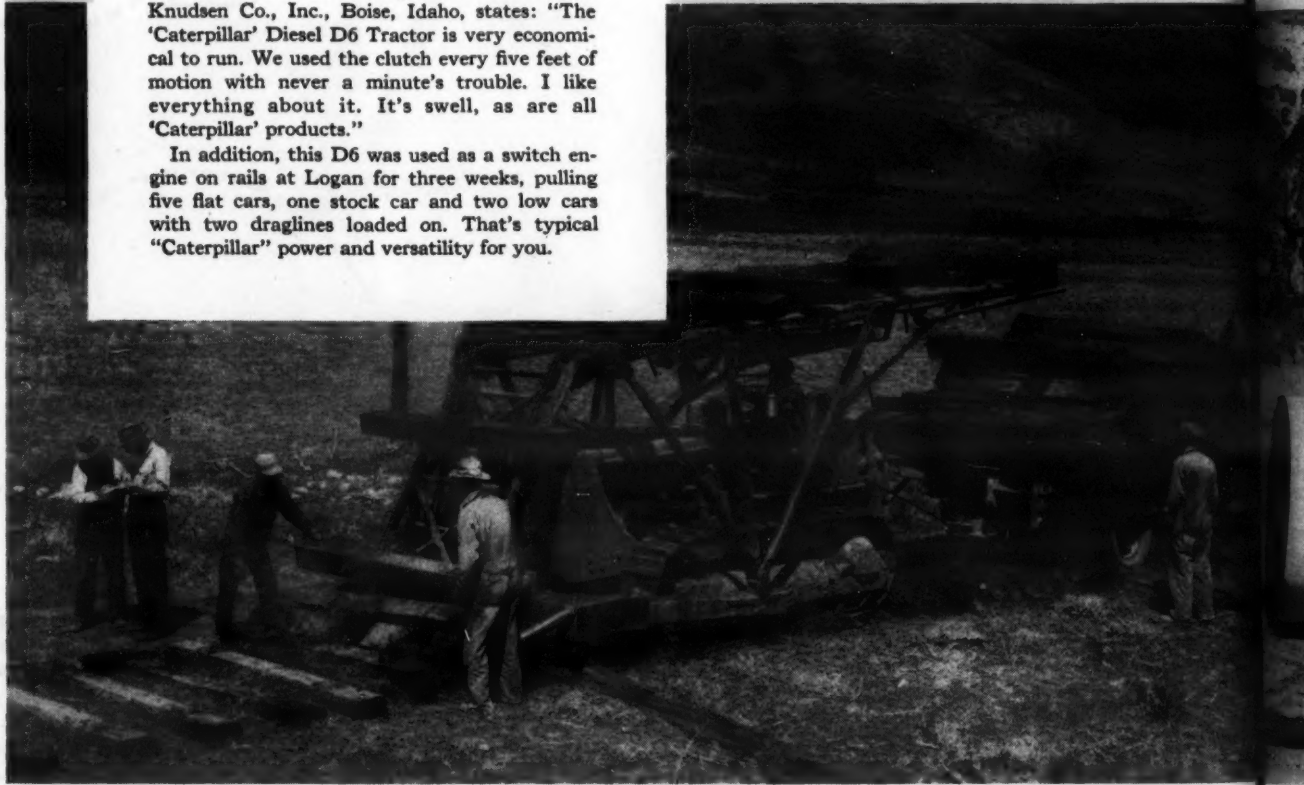
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ON THIS JOB in the San Pete Valley, a "Caterpillar" Diesel D6 Tractor with a specially built tie loader picks up ties on a branch line of the Denver & Rio Grande Railroad between Moroni and Nephi. It salvaged 38,000 ties in 18 working days—an average of 2100 ties a day.

Foreman H. M. Emery of the Morrison-Knudsen Co., Inc., Boise, Idaho, states: "The 'Caterpillar' Diesel D6 Tractor is very economical to run. We used the clutch every five feet of motion with never a minute's trouble. I like everything about it. It's swell, as are all 'Caterpillar' products."

In addition, this D6 was used as a switch engine on rails at Logan for three weeks, pulling five flat cars, one stock car and two low cars with two draglines loaded on. That's typical "Caterpillar" power and versatility for you.



BOTH of these Utah jobs are different, unusual, tough. Both call for imagination, know-how, power—rugged, dependable, versatile power. Morrison-Knudsen Co., Inc., top-flight contractors of Boise, Idaho, supplied the imagination and know-how. For power they used "Caterpillar" Diesel equipment. On both jobs, "Caterpillar" came through with colors flying.

Wherever, whenever and whatever the job, you can always count on versatile "Caterpillar" Diesel equipment for standout performance. It adapts itself to conditions

batch plant, the Colby crane picks up the concrete bucket, hoists it to the pouring deck, and lowers it again when empty. As the concrete builds up inside the forms, the vibrator men detach elephant-trunk sections, which are then lifted out of the forms and lowered to the ground. The ground man cleans the sections with water and a brush, and stacks them in readiness for the next pour.

Four Chicago Pneumatic compressed-air vibrators consolidate the concrete inside the forms, and work it around the steel. The concrete is built up by dumping each bucket down the line of hoppers, repeating the process when the lift has been completed. As the vibrator men emerge from the top, carpenters straighten the water stop, the top screeds, and the steel, and the pour

is complete. The top of the wall concrete is left rough to bond with the dome pour.

The steel forms are then stripped the following day, and Sealtext again makes its appearance to cure the inside of the wall. The outside of the pour is cured 7 days, with water which is released from perforated pipes at the top of the wall. The waste water trickling down the outside of the wall sinks into the ground immediately.

A Dome Is Poured

Concrete methods on the digester dome roofs are equally efficient. The first phase of a dome pour is the erection of the special steel mechanism which supports the dead weight from underneath.

The steel support consists of a center

steel tower which rests on the concrete below. On top of this tower are three screw jacks which actuate a telescoping mechanism in the stripping operation. This tower is set up first of all, and guyed in the true vertical position by eight cables and turnbuckles. Again we see anchor bolts used, which were left in the floor in previous pours.

Sixteen trusses now are set in place. One end of the truss rests on a bearing plate on top of the center tower, and the other end rests on blocked-out notches in the digester walls, about 3 feet below the top. Steel purlins then fasten onto the rigid framework, with 2-inch-thick wood nailers which take the rafters, or joists. Ordinary 1x8-inch shiplap lumber is then used to face the form, and is fabricated on the job.



C. & E. M. Photo

Carpenter Superintendent Presley Moore (left), shown here with his assistant Everett Pelkey, had a hand in working out details on much of the special equipment Pacific Bridge Co. used on the Hyperion project.

The intricate steel framework for dome pours was fabricated in the Compton, Calif., shops of MacCallum Steel Corp., and two sets of form supports are provided for the job. Only two shifts are required to set up the steel.

Reinforcing-steel mats and electrical and pipe connections are placed as soon as the carpenters finish, and the dome is now ready to pour.

The same concrete equipment used before comes into play. The concrete is placed first at the wall line, all the way around the dome. The crew keeps the concrete moving in that fashion, gradually building up towards the center. Whiteman power finishers are used to advantage on the large domes, and after they are done, Sealtext curing solution is again used. The total crew for a dome pour is about 20 men, most of whom are concrete finishers.

To support the load of the roof after it is stripped, 162 No. 9 high-tensile-strength steel wires are now placed by the Preload method. A small air-operated version of the bigger wire-winding machine used later is now set up near the top of the digester. The day after the pour, a band of 54 wires is built in the upper 2 feet of the wall; 54 more wires are then added during the next two succeeding days.

These wires go on at a tensile strength of between 130,000 and 150,000 psi in the same manner as those to be described a little later.

Usually, the dome can be stripped after the fourth day. After two safety bolts have been removed from each truss, the screw-type jacks are lowered to collapse the framework. Small blocked-out holes left in the digester roof are now used to hold the lowering cables, and the steel framework is disassembled and lowered to the digester floor. The steel members can then be removed through six 5-foot-diameter openings left in the dome.

Later on, when the tank is filled with water for the test, a raft will float on the water and hold the Jetcrete equipment and crew which will shoot the wall notches and other construction block-outs full of mortar. The men will get on the raft through one of the six round holes which house the actuating mechanism for the sludge.

Pre-Stressed Wire Applied

Equipment for winding the wire pre-stressing around the finished digester consists of a wood tower and a winding machine. The tower is simply a rig of convenience to allow men to get on or off the winding machine, and it has a ladder and five landings for this purpose. It also carries a small Sullivan air hoist, which hoists bundles of wire and other tools up to the winding machine.

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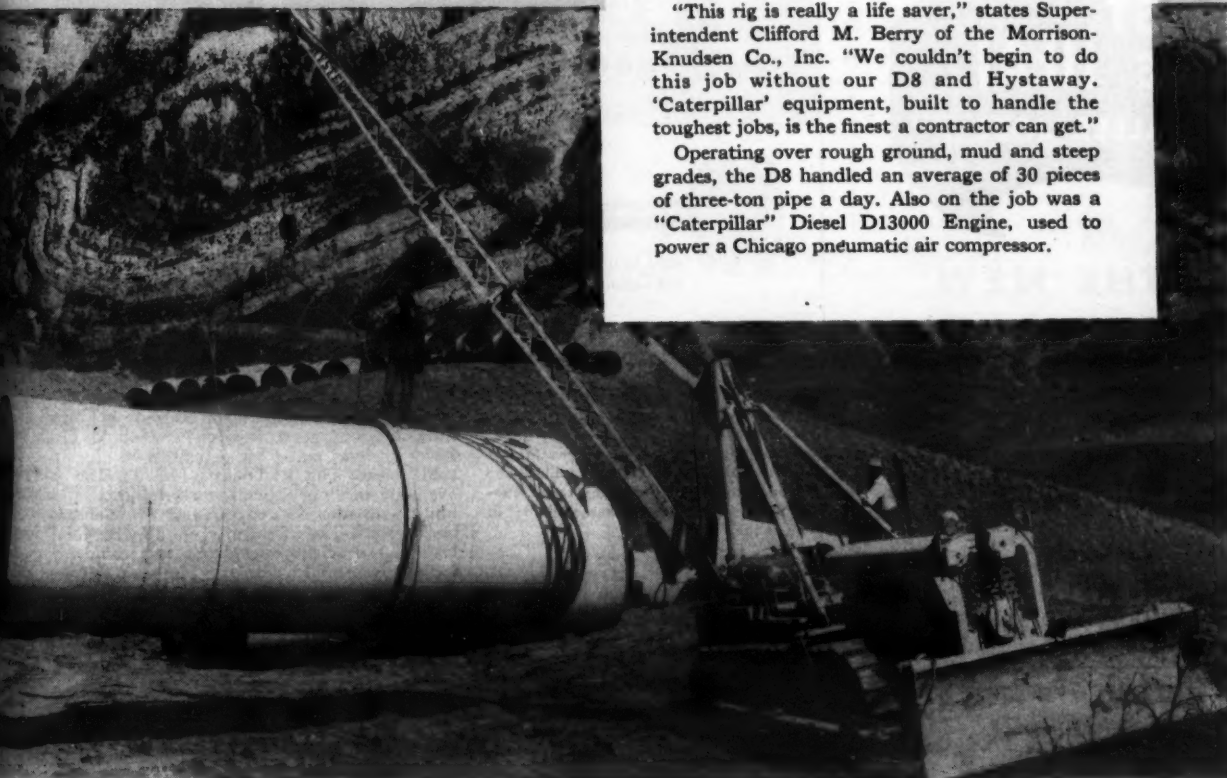
"has what it takes

... for this

ON THIS JOB in Provo Canyon, a "Caterpillar" Diesel D8 Tractor with Hystaway and 'dozer is a one-man crew installing 8'6" steel pipe—each piece weighing three tons—to replace wood flume 14,400 feet long. First it roughs out the path for the pipe and shovel—then unloads and carries the pipe into line.

"This rig is really a life saver," states Superintendent Clifford M. Berry of the Morrison-Knudsen Co., Inc. "We couldn't begin to do this job without our D8 and Hystaway. 'Caterpillar' equipment, built to handle the toughest jobs, is the finest a contractor can get."

Operating over rough ground, mud and steep grades, the D8 handled an average of 30 pieces of three-ton pipe a day. Also on the job was a "Caterpillar" Diesel D13000 Engine, used to power a Chicago pneumatic air compressor.



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C. & E. M. Photo
A Pacific Bridge Co. workman sprays Sealx curing solution on the stripped wall pour of a digester tank.

Concrete Digesters For New Sewage Plant

(Continued from preceding page)

The winding machine consists of an upper carriage which travels on rubber tires around the outer-roof perimeter or the top of the wall, supported from tipping outward by steel cables to the center of the dome. Suspended from this carriage on two hydraulically operated hoisting cables is the main winding machine. It consists of a platform, on which are mounted a Le Roi gasoline driving engine, two wire spools, and the hydraulic control mechanism. Small trucks with rubber tires bear against the digester wall.

The rig is driven from a drive shaft which engages the links of a drive chain placed around the tank. As the machine crawls slowly up the sides of the tank

in making its rounds, this drive chain also comes up.

To start the winding process, a patented metal "torpedo", which grips the wire tightly under strain, is slipped on, with an eye screwed in the other end. A Drive-It gun, which literally shoots a metal stud in the concrete with a 0.38-caliber shell, then anchors a stud through this eye.

The wire is wound around the tank from the bottom towards the top. The tensile-strength requirement means that there is a pull of over a ton on the wire at all times. Before going on the tank wall, the wire passes from the spool through sheaves to a 0.141-inch die, which necks the wire down from 0.162 inch and boosts its temperature nearly 300 degrees.

A roll of wire will ordinarily cover about 16 wraps, so as a safety measure, in case the wire should break, a patented screw-type fastener is put on about every eight turns to snub the wire. Also, in installing a new roll of wire, a double "torpedo" is used, with a metal eye in the center. This connection is always anchored by studs from the Drive-It gun, as a safety measure.

The 1,300 wires are variably spaced from the bottom towards the top, depending on the tank hydrostatic load, and go on in this fashion in about four layers, with pneumatically placed concrete between layers. The machine travels at a speed of 7 miles an hour. Each tank requires 90 miles of wire wrapping, and the crew has wound as many as 15½ rolls in 8 hours.

After the wire is placed, it is then covered with a 1-inch coating of pressure-applied mortar. The Jetcrete mix is dry-batched at the batch plant, and usually run through the plant mixer, although sometimes a small



C. & E. M. Photo
At left, Project Engineer Stanley Kimball; at right, General Superintendent Charles Bisordi, on the Hyperion sewage-treatment plant job.

Ransome paver is used. It is then trucked out to the digesters, where one man shovels it into the receiving hopper of a CMC Model 200 Jetcrete gun,

powered by a Le Roi engine. Cement and sand are sent at high pressure through a hose to the Jetcrete application nozzle, where water is applied at slightly higher pressure. The mortar strikes the digester walls, covers the wire, and leaves a neat-looking job. There is very little rebound.

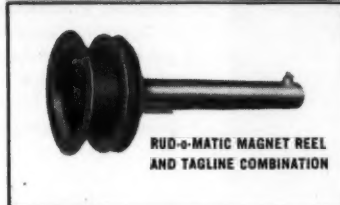
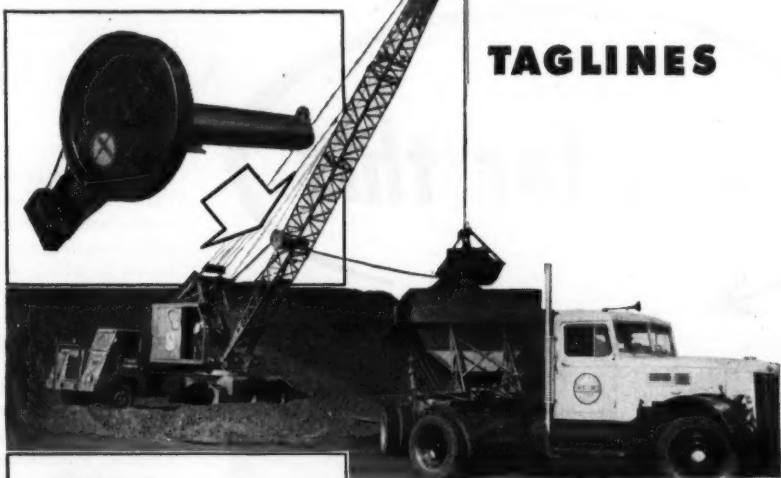
After all the piping and machinery are installed, the tanks will be individually tested. The water level will be built up to elevation 54.75. When the construction openings are Jetcreted in, air pressure equal to 10 inches of water pressure will then be added. Water leakage must not exceed 1 gallon per minute in a 3-day test, and in no case can drops or trickles be accepted. The first tank has already been water-tested and was remarkably tight, without even one damp spot noticeable.

There is much more to be done before the big plant is finished, of course, and as the work progresses, other units will undoubtedly present their own problems and be featured by CONTRACTORS

(Concluded on next page)

RUD-O-MATIC

TAGLINES



INCREASE MAGNET CABLE LIFE

The electric cable cannot jerk or pull loose from its terminals—tangle or snag. Spring tension steadies the magnet. Both cables feed together with tension on the tagline cable and slack on the electric cable. Used as standard equipment by most crane manufacturers—available in 5 models to fit your needs.

*DEALERS—a few selected territories in the Midwest and Northwest are still open. Write for all details.

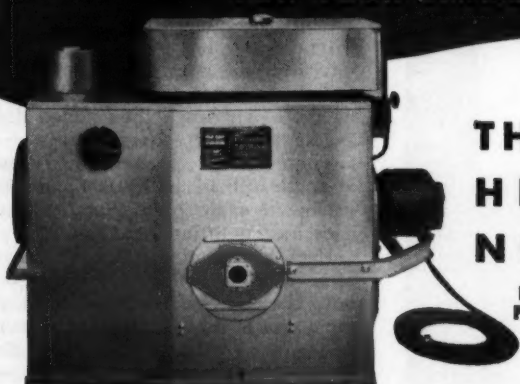
Provides positive, steady tension—holds buckets steady under all working conditions

A silent, efficient, and dependable worker on all jobs—RUD-O-MATIC Taglines are used as standard equipment by most crane manufacturers. The spring tension is powerful enough to hold a clam shell bucket steady under the roughest and toughest of conditions. Operates perfectly with boom at any angle. Compact—it can be installed in less than thirty minutes. There is none of the trouble found with the average tagline for there are no pins, weights, tracks, or carriages to wear or be replaced, and fewer sheaves make for a definite saving in cable wear. The RUD-O-MATIC Tagline is available in eight models, each designed and built with the desired tension for various bucket sizes. Taglines are complete with fairlead U bolt clamping plates, and cable attached. Immediate delivery—see your equipment dealer—or write—

RIGHT: The RUD-O-MATIC Combination Magnet Reel and Tagline used on an overhead crane operation. Easy to mount—easy to service. Pays for itself in a short time through electric cable savings alone!



NEW LOW COST PORTABLE HEAT FOR YOUR SMALLER JOBS



THE NEW HERMAN NELSON

Economy Model Portable Heater.

- Provides Quick, Clean, Safe Heat — without smoke, soot, fumes or open flame!
- Abundant fresh, heated air — forced to areas where most needed!

Burns range oil, kerosene or prime white distillate—costs but 19¢ per hour!

125,000 BTU per hour capacity—enough to heat almost two ordinary 5-room houses.

Electric motor powered; 115-230 volt, 60 cycle, single phase.

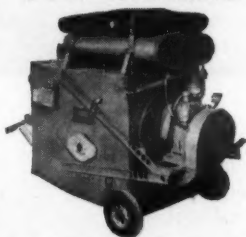
One 12" dia. x 12' long, extendable hot air duct.

Small, compact, light weight.

Low PRICED FOR THE SMALLER JOBS!

Write for Interesting Free Booklet on "Cost Control"

Still Available



The original Herman Nelson, gasoline burning, gasoline engine powered, Portable Heaters. For areas lacking electric power. Completely self-powered. Easily portable by one man.



THE HERMAN NELSON CORPORATION
MOLINE ILLINOIS

SINCE 1906 MANUFACTURERS OF QUALITY HEATING AND VENTILATING PRODUCTS

McCAFFREY-RUDDOCK Tagline CORP.

2131 EAST 25th STREET, LOS ANGELES 11, CALIFORNIA

AND ENGINEERS MONTHLY. Completion of the job will mean a modern sewage-disposal system at last which will serve Los Angeles and many of its neighboring cities.

Personnel

The Hyperion Activated Sludge Plant was designed and is being constructed under the general supervision of Lloyd Aldrich, City Engineer of Los Angeles, with Merrill Butler as Deputy Engineer in general charge of the design, and Gunther Redmann as Project Engineer. Ted Niederhofer, Inspector of Public Works, is directing field construction, with M. D. McManus as Supervising Engineer and C. A. Harris as Senior Inspector.

In addition to Charles Bisordi and Stanley Kimball for Pacific Bridge Co., Presley Moore was the Carpenter Superintendent and Clint Miller was the Master Mechanic who so ably worked out details on much of the special equipment used on this job.

Bucket Can Be Lifted With Slack Dragline

A dragline bucket which can be hoisted with a slack dragline has been designed by the Berner Engineering Co., 1955 Lafayette St., Santa Clara, Calif. It is said to eliminate the use of the drag brake and to permit lifting as soon as the bucket is filled. Among the features claimed for the Berner buckets are: shorter dragging distances, elimination of the arch, stronger construction, increased range of dragline, larger and lighter buckets, a full load each pass, and center of gravity farther to the rear.

The Berner buckets are made in two styles: the standard Short-Cycle style; and a Short-Boom style for use with short-boomed equipment, where the bucket is pulled close up to the dragline in order to fill. Both models are manufactured in sizes ranging from 1/4 to 40 cubic yards in capacity.

The bucket teeth have welded-on bases and reversible, replaceable manganese points. Buckets with special teeth arrangements are available according to the user's specifications. The digging lip is made from mild steel and is of a welded-box-type construction. It is filled with lightweight concrete to increase its stiffness. The lip is protected between the teeth and along the sides of the bucket by means of a lightweight manganese welded-on digging edge. The digging edges can be replaced, the manufacturer states, by chipping them loose and re-welding. The drag chain is connected to the bucket through an adjustable link which permits three digging positions. These positions are changed, without moving the chain or link from the bucket, by means of a single pin-and-lock bolt. The weight of the bucket is supported by the hoist chain, with a small over-balanced portion handled by the control chain.

Further information on this line of



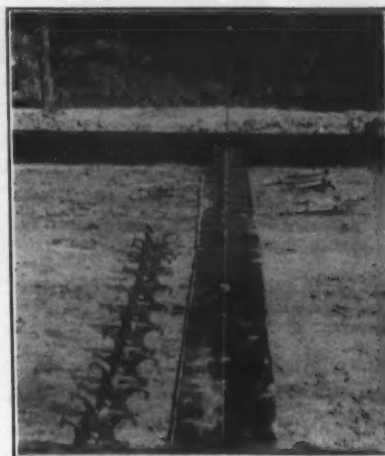
The new Berner Short-Cycle dragline bucket, which can be hoisted with a slack dragline, is said to reduce digging time by 29 per cent. It is made in two styles and many sizes.

dragline buckets may be secured from the company, or by using the enclosed Request Card. Circle No. 124.

Joint Base Plates Eliminate Pumping

An asphalt-mastic base plate for use under expansion and contraction joints has been developed by the Keystone Asphalt Products Co., Division of American-Marietta Co., 43 E. Ohio St., Chicago 11, Ill. These asphaltic boards will provide a vapor and moisture seal, the manufacturer states, and they will serve to prevent pumping action in concrete. They are said to be simple to install, economical, and long-lived.

The asphalt-mastic board is 1/4 inch thick and is furnished pre-cut from the factory. It serves as a base plate to keep load-transfer units from sinking into the roadbed, as well as a permanent base against pumping action. Keystone will fabricate the base-plate material for use with any type of load-transfer unit specified by state highway departments. It points out that the boards have been tested and accepted by the Michigan State Highway Department, and that Texas is now conducting



Keystone's asphalt-mastic joint base plate is shown here with half of the load-transfer units in place.

experiments with them.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 106.

Up She Goes!

American Portable
Material Elevator carries 2,500 pounds
to 40 feet or higher at 87 feet
per minute!

Moves anywhere by truck . . . sets up quickly by
its own power . . . stands on its own feet!



Forget the hammers and saws. Forget the slow, costly, tiresome job of tearing down your last timber scaffold and building a new one. The American Portable Material Elevator puts itself up!

Load it all on one truck, in sections. At the job site, just bolt it together. Start the hoist, and watch it swing that sturdy triangular tower up to vertical. Once it's up, you're ready to go.

The skip platform is 6' x 6'; holds two wheelbarrows; lifts 2500 lbs. For jobs higher than 40 feet, two 10' tower extensions can be added.

Want descriptive literature—prices—specifications? Write today . . . or see your nearest distributor.

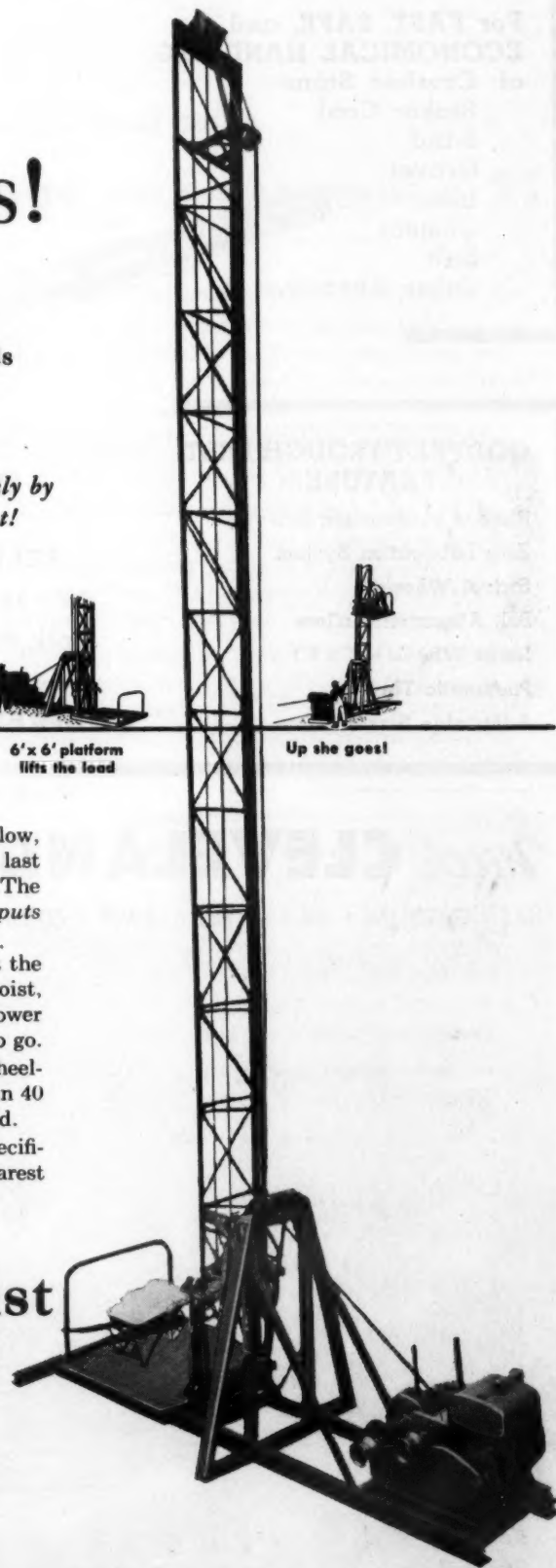
American Hoist and DERRICK COMPANY

St. Paul 1, Minnesota

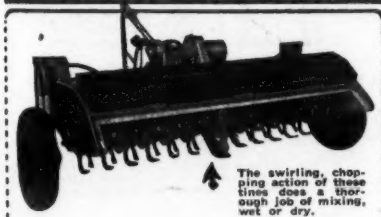
Plant No. 2: So. Kearny, N. J.

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FOR SECONDARY ROAD CONSTRUCTION... ARIENS AGGMIXER



The swirling, chopping action of these times does a thorough job of mixing, wet or dry.

HERE'S equipment designed especially for mixed-in-place construction—to operate in connection with other general purpose equipment. Whatever aggregates are used it thoroughly pulverizes, mixes and aerates aggregates with binder—rapidly and economically. Also ideal for soil cement stabilization. Safe . . . made 4 standard sizes, 4', 5', 6' and 7'. Write for details.

ARIENS COMPANY BRILLION WISCONSIN



An Athey Force-Feed Loader, an Athey portable crusher unit, and two motor graders teamed up in Wayne County, Mich., to reclaim 3¼ miles of old black-top road.

Crusher Unit Helps Reclaim Black-Top

An old black-top road in Wayne County, Mich., was recently reclaimed by a crew of three operators. The equipment used for ripping the old black-top, crushing it to proper size, and re-laying it consisted of an Athey Force-Feed Loader, an Athey portable crusher unit towed behind the loader,

and two motor graders. No materials were added other than a small amount of MC-1 oil.

Key machine in the process was the new Athey portable crusher consisting of a Cedarapids impact mill driven through a multiple V-belt drive by a 38-hp Caterpillar D311 diesel engine. First, a motor grader scarified the road to a depth of 4 inches. The material was windrowed and then picked up and

conveyed directly to the crusher by the Force-Feed Loader. M. N. Brown, Wayne County Superintendent, reports that the crushed material was then shot with oil at the rate of ½ gallon per yard.

As the main features claimed for the process, the need for transporting to and from a central crushing plant was eliminated, and the material was picked up, crushed, and re-laid in a continuous operation.

Hill Names H. B. Robbins

Herman B. Robbins is appointed Manager of the Hill Diesel Engine Division of Drake America Corp., New York. Hill, purchased by Drake America in early 1948, manufactures diesel engines in sizes ranging from 10 to 60 hp, and electric-generating sets in sizes of from 7½ to 30 kw. The Hill factory is located in Lansing, Mich.

Mr. Robbins will take charge of all sales activities for Hill. He is planning a series of trips to appoint additional

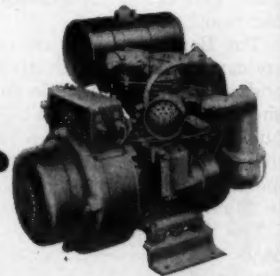
distributors, as well as to visit those already established.

NO MORE LIGHTING PROBLEMS FOR ME!



On small and medium size jobs I've found the answer to lighting problems with a compact "General" generating set.

Gas engine driven and ruggedly built, these "General" sets are my ideal where up to 2000 watts are required.



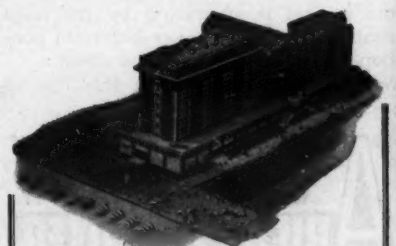
Models available from 300 to 2000 watts, either AC or DC.

For the "General" set to solve your lighting problems, send for a complete catalog today.

DEALERS: Exclusive territories now open. Write —

GENERAL LIGHTING PRODUCTS

243 Canal Street, Dept. CE
New York, New York



HOTEL STRAND

ATLANTIC CITY'S HOTEL of DISTINCTION

Devoted to the wishes of a discriminating clientele and catering to their every want and embracing all the advantages of a delightful boardwalk hotel.

Spacious Colorful Lounges—Sun Tan Decks atop—Open and Inclosed Solaria—Salt Water Baths in rooms—Garage on premises. Courteous atmosphere throughout.

When in Atlantic City visit the FAMOUS FIESTA LOUNGE RENOWNED FOR FINE FOOD

OPEN ALL YEAR
Under Ownership Management
Exclusive Penna. Ave. and Boardwalk

For FAST, SAFE, and ECONOMICAL HANDLING of: Crushed Stone

Stoker Coal
Sand
Gravel
Lime
Cement
Salt
Other Abrasives



GODFREY CONVEYORS

GODFREY TROUGH BELT FEATURES:

Rugged construction thru-out
Zerk Lubrication System
Swivel Wheels
Belt Alignment Rollers
Large Wheels (42" x 6")
Pneumatic Tires
Adjustable Screen-Chute

BELT WIDTHS:

16" - 18" - 24"
4 ply, 28-ounce Duck

CAPACITY:

16" - 30 Yards
18" - 40 Yards
24" - 75 Yards
Gravel per Hour.

GODFREY CONVEYOR CO.

Elkhart 6, Ind.

With CLEVELANDS on the Trenching Jobs

GAS • GASOLINE • OIL • WATER • SEWER • CONDUIT • CABLE • DRAINAGE • BUILDING FOUNDATIONS



You get MAXIMUM YARDAGE

In MINIMUM TIME

At MINIMUM COSTS

CLEVELANDS, through their compact, wide crawler, wheel-type design, fine engineering, quality construction, ample power and a wide range of transmission-controlled speed combinations, meet most efficiently the toughest going on the long lines and easily and quickly complete the various short scattered jobs. Low fuel consumption and a minimum of maintenance and repair costs assure maximum economy of operation and upkeep.



THE CLEVELAND TRENCHER CO.
20100 ST. CLAIR AVENUE CLEVELAND 17, OHIO

New Road Graded By Tractor-Scrapers

**Sand-Clay Subgrade Topped
With Gravel Base Course;
Is Then Surface-Treated,
Sealed With Plant-Mix**

✦ A STRETCH of 4.4 miles of State Route 14, east of Selma, Ala., has been improved from a gravel-base road to a hard-surface black-top. Considerable grading was required, for in removing the sharp curves and abrupt dips and rises, the old road was almost completely relocated. The Alabama State Highway Department awarded a contract for the work to Dozier Bros. Construction Co. of Mt. Meigs, Ala., on a low bid of \$169,222.74. The job got under way shortly after the beginning of 1948 and was completed in November.

The project is in Autauga County, in the central part of the state. It begins at Big Mulberry Creek on the west, which is the county line, and runs east. It is known as the Burnsville-Autaugaville Road, after the small communities which lie west and east respectively of the improvement. The contract included grading, drainage, a single bituminous surface treatment, and the laying of a plant-mix seal. This section of State Route 14, a 35-mile stretch between Selma and Prattville, had never been paved, because of difficulties in obtaining the necessary right-of-way for better alignment.

Grading

Little was accomplished during the winter and early spring because of the extremely wet weather. Some progress was made with the drainage structures, however, even if the going was too thick for moving dirt. Concrete culverts were built, and around 1,800 linear feet of reinforced-concrete pipe was laid. This ranged in size from 18 to 42 inches in diameter. The smaller-size pipe was set by hand. The larger pipe was handled either by a Lorain crane with a 40-foot boom and pipe hook, or by an International TD-18 tractor rigged up with an A-frame pulley and cable in front.

The structures were poured with truck-mixed concrete supplied by the Cosby Sand & Gravel Co. of Selma, Ala.

At the same time a crew was clearing 71 acres of woods and thickets over the new right-of-way.

The grading, which included 195,500 cubic yards of excavation, was sublet to M. R. Thomason, a Montgomery, Ala., contractor. No borrow was required as the cut and fill quantities balanced out. The material was the typical sand-clay of this part of Alabama, with no rock at all. It was easy to dig into when dry, but slick and tricky to handle when wet.

For moving the dirt, tractor-scraper units played the major role, with hauls averaging around 750 feet. Four such combinations were on hand—two Le-Tourneau LP 12-yard Carryalls pulled by Caterpillar D8 tractors, and two Le-Tourneau 8-yard LS Carryalls pulled by an International TD-18 and a Cater-



C. & E. M. Photo

This view of grading on Alabama State Route 14 shows a D8 with an LP Carryall unloading and spreading material in an 8-inch lift on the fill. The road at right has to come down 6 feet and the fill must go up 6 feet before final grade is reached.

pillar D7 tractor. They normally loaded themselves without pusher assistance. A couple of D8 dozers were on the job for leveling and spreading the material which was placed in 8-inch lifts.

Compaction was achieved with two

sets of LaPlant-Choate sheepsfoot rollers pulled by a Caterpillar Thirty-five and an RD6 tractor. A compaction of 95 per cent maximum density was required in building up the fills, and 100 per cent

(Concluded on next page)

3 times more life

when hard-faced with

STOODY SELF-HARDENING 21

On a competitive test, crushing quartzite at high speed, this portable roll crusher operated 3 times longer when protected with Bare STOODY SELF-HARDENING 21 than with a more costly alloy. An additional bonus was obtained in freedom from spalling—even after repeated hard metal applications.

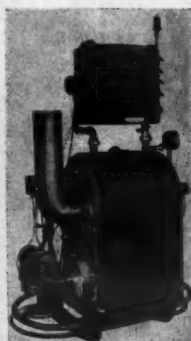
The new STOODY SELF-HARDENING 21 holds many advantages to users of heavy equipment:

Exceptional abrasion resistance • Good impact strength • Heavy deposits in a single pass • Bare rods run as easily as coated with D.C. electric welders • Can also be applied with A.C. • No slag • Multiple passes • Bonds readily to manganese steel, cast iron or common steels

For all-around weldability, STOODY SELF-HARDENING 21 can't be beat—its exceptional burn-off rate, wide amperage latitude and freedom from slag interference save you time, simplify hard-facing requirements. Try 50 lbs. on your next wear-proofing job. Call your Stooddy dealer for complete information and literature ... or write to

STOODY COMPANY 1136 W. SLAUSON AVE., WHITTIER, CALIF.

HEAT-- Anytime-Anywhere



Eco-Temp portable heaters provide immediate, economical heat for thawing out equipment and materials on the job. Used for keeping concrete warm, drying paints and plaster, and for heating rooms and shelters, etc.

Operates on 110-volt, AC electricity and burns No. 2 fuel oil.

Eco-Temp is made in two styles; steam model delivers 181,000 Btu's per hour, and hot-water unit delivers 113,000 Btu's per hour. Which model best meets your needs? Write for full details.

Dealers: Certain territories still available. Address:

ARTHUR C. BAUMANN
7011 Grays Ave., Philadelphia 42, Pa.



New Road Graded By Tractor-Scrapers

(Continued from preceding page)

in the top 8 inches. Two large tank trucks containing 2,500 and 2,000 gallons of water, with spray bars at the rear, were available for wetting down the fills. But the sand-clay cuts were sufficiently moist so that additional water was not required.

New Roadbed

Grading started at the east end of the job and moved westward. During the work at the east end, traffic used a convenient detour while a 12-foot fill was being placed on top of the old road. After this section was completed, traffic was maintained over the old road. The highest fill on the project was 18 feet, while the deepest cut was 45 feet in a sidehill excavation.

The new roadbed is 30 feet wide with 4 to 1 side slopes where the cuts and fills are 5 feet and under. Above that the slopes are 1½ to 1. The paved surface is 20 feet wide with a crown of ½ inch to the foot. On each side, the 5-foot shoulders slope at the rate of ½ inch to the foot.

A Caterpillar No. 12 motor grader did the final shaping on the subgrade and dressed the slopes. On the slopes of the high cut, a cable was passed from the grader to a tractor on top of the cut as a safety measure, and to give the grader more latitude in maneuvering. Ditching and excavating for a channel change was handled by a Koehring dragline equipped with a 45-foot boom and a ¾-yard bucket.

The four tractor-scrappers were not used continually, as the number was sometimes reduced to two units according to job conditions. But with from two to four rigs working, an average of around 3,000 cubic yards of dirt was moved in a 10-hour day.

Gravel Base Course

Over the subgrade a gravel base course, 8 inches thick, was laid the full width of the roadbed. This was put down in two 4-inch lifts, with a minimum of 100 per cent compaction on each layer. The gravel was obtained from a pit about a mile off the center of the job. One Bay City ¾-yard shovel worked the pit, loading out to an average of 12 trucks hired on a yard-mile basis. The pit-run gravel conformed to the following gradation requirements:

Sieve Size	Per Cent Passing
2-inch	100
1½-inch	75-100
No. 4	35-85
No. 10	30-75
No. 40	35-95
No. 60	28-75
No. 200 (silt and clay)	9-39
Clay	9-23

The material passing the No. 10 screen is classified as soil binder.

The gravel was spread by three motor graders, mixed thoroughly by a disk harrow, and also sprayed with water to optimum moisture to get good compaction. It was then rolled, first by sheep-foot rollers and finally by two sets of rubber-tire rollers. On this work the sheepfoot rollers were pulled by International rubber-tired tractors and the pneumatic rollers by Farmall rubber-tired tractors.

After a solid packed base had been obtained, any loose material was then swept off by a Grace power broom, also pulled by one of the rubber-tired tractors.

Black-Top Pavement

The bituminous operations in the construction of the black-top pavement were performed by the Haigler Construction Co. of Montgomery, Ala., under a subcontract. First the center 21 feet of the roadbed was primed with a single application of MC-1 cut-back asphalt at the rate of 0.20 to 0.23 gallon to the square yard. After this had cured for from four to five days, a 20-foot-wide surface treatment was laid down.

This consisted of an application of AC-15 asphalt, 0.37 gallon to the square yard, which was covered with slag distributed through spreader boxes at the rate of 0.42 cubic feet to the square yard. The gradation of the slag cover aggregate was as follows:

Sieve Size	Per Cent Passing
1-inch	100
¾-inch	80-100
½-inch	0-10
No. 4	0-3

After the material was well rolled in by both rubber-tire and steel-wheel tandem rollers in that order, the excess aggregate was broomed off the highway. Then a single course of plant-mix, Alabama Class F, Type F-1, was laid by mechanical finishers at the rate of 80 pounds to the square yard—also to a 20-foot width. The hot-mix was hauled in trucks from the Haigler Construction Co. asphalt plant in Montgomery.

Quantities and Personnel

The major items involved in this highway contract included:

Common excavation	195,500 cu. yds.
Gravel base course	30,130 cu. yds.
Bituminous surface treatment	57,150 sq. yds.
Plant-mix	57,150 sq. yds.
Reinforced-concrete pipe, 18 to 42-inch	1,800 lin. ft.

For the prime contractor, Dozier Bros. Construction Co., Edison Carr was Superintendent. The grading work of M. R. Thomason, the subcontractor, was supervised by Allen J. Bowers. An average force of 25 was employed.

For the Alabama State Highway Department, R. M. Lancaster was Resident Engineer. The Department is headed by Ward W. McFarland, State Highway Director. Marvin Taylor is Construction Engineer. The improvement is located in Division 3 where S. J. Cummings is Division Engineer with headquarters at Tuscaloosa.

Pillow Blocks, Bearings

An abridged edition of its general catalog on ball and roller bearings has been put out by SKF Industries, Inc., P. O. Box 6731, Philadelphia, Pa.

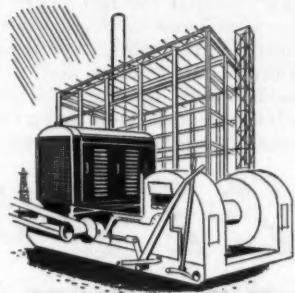
This 76-page catalog, No. 280-A, devotes considerable space to engineering

data on load calculations, selection of shaft and housing tolerances, and conversion tables. It also lists data on the mounting, lubrication, and maintenance of the SKF pillow blocks and bearings.

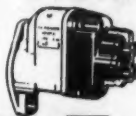
Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 3.

Get a New MAGNETO

Before you wish you had!



Don't wait till the day your engine refuses to start! Replace that old, worn magneto with new Fairbanks-Morse Super-Spark magneto ignition—and get the sure, hot spark that means easy starting in any weather, smooth firing and efficient operation year in and year out. Easy to install—inexpensive, too! Fairbanks, Morse & Co., Beloit, Wis.



Replace Your Magnetos with

FAIRBANKS-MORSE

Sold and Serviced by Over 2,000 Experts

RUGGED • STURDY

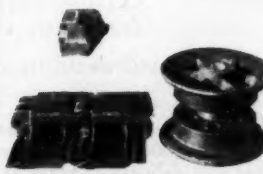
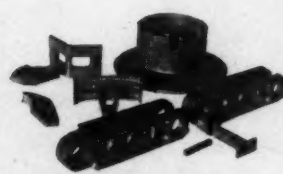
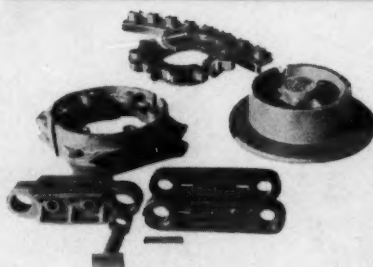
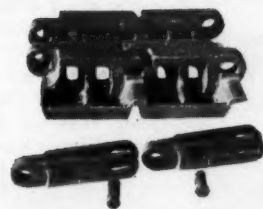
Performers

Pacific

WEARING PARTS FOR DITCHING MACHINES

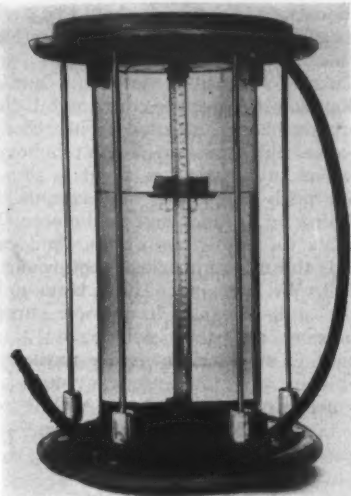


ALLOY STEEL & METALS CO. manufactures an extensive line of wearing parts for most makes of ditching machines. The material used in the manufacture of these parts is of the highest quality, scientifically alloyed to obtain the longest wearing qualities combined with great strength. Pacific Ditching Machine Parts assure long, dependable service. Expensive downtime is reduced to an absolute minimum.



ALLOY STEEL & METALS CO.

1862 EAST 55th STREET • LOS ANGELES 11, CALIFORNIA



Function of the Volumeter No. 770 is to determine in-place volumes of removed materials for density and other tests. It does so by filling the removal cavity with water enclosed in a balloon and so determining the volume of the cavity.

Volume of Cavities Determined by Meter

A device for determining the volume of holes and irregularly shaped cavities is manufactured by the Rainhart Co., 620 W. 34th St., Austin, Texas. Because it thus measures in-place volumes of removed materials, it is especially recommended by the company for use in running density and other tests. In operation, the No. 770 Volumeter fills the cavity with a measurable amount of water in a rubber balloon, and thus provides a direct reading of the volumes involved.

Principal components of the Volumeter are a Neoprene balloon, a glass jar filled with water, an air hose with a mouthpiece, and a float index attached to a calibrated scale. Air blown into the mouthpiece causes water to flow into the balloon attached to the bottom of the jar. As it fills, the balloon occupies the removal cavity completely, conforming to the wall projections, undercuts, etc. When it thus completely occupies the cavity, readings are taken from the scale, which gives the answer directly in cubic feet of volume. The readings are made to the nearest 0.0002 cubic foot, and are said to be accurate within 1 per cent.

The Rainhart Volumeter No. 770 has a water capacity of 0.36 cubic feet. It is said to operate best in cavities of from 6 to 10 inches in diameter and from 4 to 12 inches deep. A smaller size is also marketed.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 42.

Hand-Size Riveter For Brake Relining

A hand riveter for use in relining brake bands and brake shoes is announced by the Replacement Sales Dept. of the United States Asbestos Division of Raybestos-Manhattan, Inc., Manheim, Pa. It is designed for use with internal or external brakes, such as those used on shovels, cranes, draglines, and other heavy-duty construction equipment. According to the manufacturer, brake bands and brake shoes can be relined in the field using a Grey-Rock riveter and an electric drill.

The Grey-Rock hand riveter is suitable for handling linings up to 10 inches in width, using Series No. 7, 8, or 10 tubular rivets. It will handle rivets up to 2 inches in length. The riveter comes equipped with 3/16 and 1/4-inch roll sets; 3/8 and 1/2-inch anvils; 3/16 and 1/4-inch drills; 3/8 x 3/16, 1/2 x 3/16, and 1/2 x 1/4-inch counterbores fitted with depth gages to control depth of countersink; six C-clamps; and one wrench. The Grey-Rock hand riveter is supplied with a metal carrying case

which measures 12 x 6 x 3 inches.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 65.

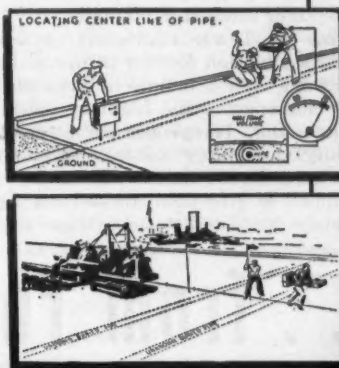
Rotary Plow Has Dual Auger

Rotary snow plows for high-speed snow-removal operations are described in a bulletin released by Sicard Industries, Inc., 30 Rockefeller Plaza, New York 20, N. Y. The Snow Master is manufactured in two sizes—standard and Junior—both of which are described in the bulletin.

Close-up photographs show the construction and operation of the various parts of the Snow Masters, including the dual augers, the casting chute which directs the flow of snow, the turbine which throws the gathered material, the wheel-hook-up mechanism for providing 4-wheel drive, the interior of the cab and the location of all controls, and the special torque rod for supporting the axle to the chassis. Two over-all views show the Snow Master

equipped with a water-flushing unit for summer street-cleaning operations. And another shows a Traction Master dump chassis with a dump body.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 58.



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Canadian Factory: 2-20 Fraser Ave., Toronto 1, Ont.



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Step 1 in Financing State Highway Needs

(Continued from page 1)

longer be put off, it is far more costly than it would have been had early action been taken.

In the state of Washington, too, the legislative interim committee on highways has done an excellent job of tabulating highway needs. But here again, the financial question must be settled before action can be taken on the committee's findings. The report of the highway department engineering committee in Washington lists road improvements totaling more than \$500,000,000 as the very minimum needed to bring Washington's state road net up to acceptable modern standards. Graphic evidence of the sad state of deterioration to which its highways have been reduced is the fact that of its total primary state highway mileage of 4,055 miles, 3,682 miles were found to require improvement, and 1,553 of its 2,130 miles of secondary state highways were found to be sub-standard. Out of 1,620 bridges on the state highway system, 702 must be reconstructed or replaced by new structures to bring them up to standard.

The rehabilitation of Washington's primary highways, including bridges, will cost an estimated \$364,783,000. Rehabilitation of its secondary highways will cost \$144,649,000. Thus, Washington's road needs for the immediate future total \$509,432,000. On the basis of a 12-year construction program, funds in excess of \$43,000,000 per year must be provided for new construction alone. Moreover, these figures make no provision for administration, maintenance, and capital outlay. Increased administrative costs and additional office capacity are inevitable if such an enlarged program is undertaken, and when these factors are taken into consideration, Washington faces the problem of digging up \$62,000,000 a year during the next 10 years if it wants a safe and adequate highway system within that time. If 12 years are taken to do the job, \$53,000,000 a year is needed, and it will take \$45,000,000 a year to complete the job over a 15-year period.

And this is where Washington finds itself in the same predicament as most of the other states. Under present sources of revenue the Department of Highways in Washington can expect to receive no more than \$20,000,000 a year, exclusive of Federal Aid. This simply means that unless something is done to augment highway revenues, it can expect to receive less than half the funds necessary to provide for its very minimum highway needs.

In Oregon, too, the legislative interim committee is in possession of the facts as to what is needed to give that state an adequate road system. The construction cost is estimated at \$468,000,000. Here again, we see a state facing the harsh facts of life. There simply isn't enough money available to do the needed work, and under present financing methods there never will be enough. The combined highway needs of the three Pacific-coast states total about \$3,000,000,000, and those needs are critical.

How Can the Needs Be Financed?

This leads us very naturally to the big question: What can be done about it? Can anything be done to surmount this financial obstacle which, throughout the nation, blocks the progress of adequate highway development?

I think something can and should be done about it. The interim activities of many of our state legislatures have done much to focus the attention of the public on highway matters. They have awakened a public interest in and concern for better roads. In Washington, as an example, a public-opinion survey

made by the University of Washington this year has disclosed that the citizens of that state are more interested in highways and ferries than in any other single topic. Highways are more in the public mind than education, the Russian situation, or any of the other issues which make daily headlines. Since this is true in one state, it is reasonable to assume that it is a matter of considerable public interest in all states.

This is, I am convinced, a very healthy situation for the future of our highways, and I believe it presents a real challenge to the highway officials of the nation. The people are interested in highways. They want to know the true facts about them. Who is better equipped to give them these facts, accurately and undistorted, than their

own highway departments?

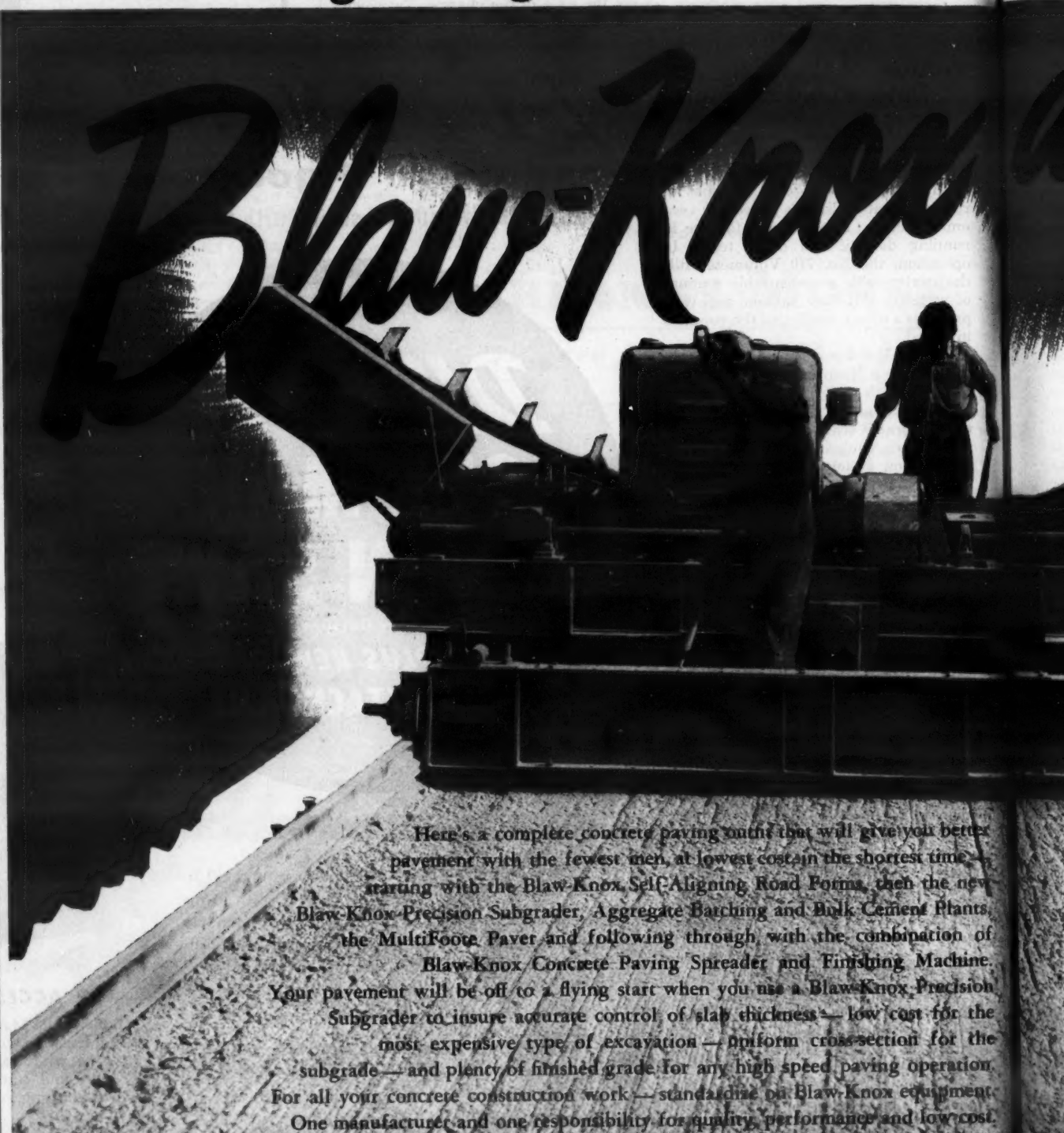
In a recent message to the American Automobile Association, Mr. Alfred P. Sloan, Jr., Chairman of the National Highway Users' Conference, had this to say: "What happens in the next few years will have a vital bearing on the extent to which a greatly expanded and prosperous highway transportation plant will go forward. The increasing use of motor vehicles will be influenced by a program in each state which will strike a sane balance between the development and expansion of the highways, and the means by which this expanded plant will be financed over a period of years. This cannot be done effectively on a hit-or-miss basis. Nor should it be blueprinted and arbitrarily laid out by any Federal authority or any

national organization. It should be done by each state and an informed public opinion must back it."

This is a sensible statement, and I believe most states are carrying out the planning phase suggested by Mr. Sloan in a sensible manner. I don't believe, however, that we can point with as much pride to our accomplishments in building up an informed public opinion to back the highway program. And yet this is the most important requirement of all. We can make blueprints and plans and models from now until doomsday and they will never gain reality in steel and concrete until the people of our states are convinced of the need for them and are willing to pay the bill for their construction.

(Concluded on next page)

... from rough subgrade to finished



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Let's Give the Public Facts

The people want the answers. Highway departments have the answers. Isn't it reasonable to make some concerted effort to tell the people the true facts about their highways? Sooner or later departments are going to have to assume that responsibility, and I am convinced that when they do, the highway financing problems will be much closer to a solution.

I don't believe that one motor-vehicle owner out of two hundred has even the vaguest idea how much he contributes each month to the maintenance of the highway system he enjoys. I am sure that the average motorist, if asked to make a guess as to the sum, would venture an amount far in excess of what he actually pays. The contribution

made by the average vehicle owner to state highways in 1946 varied, in the twelve western states, from a high of \$5.09 per month in New Mexico to a low of \$1.23 per month in California. The average Washington motorist paid \$1.82 a month for his state highway system, and the average payment for all the western states was \$2.07 per month.

I wonder, too, how many highway users have given any consideration to the comparative cost to them of their state highways and of the other public utilities which they enjoy. In Washington, where the average automobile owner contributes \$1.82 a month to his state highways, the average monthly light bill is \$4.42 and the average monthly telephone bill is \$5.97. If we

consider our highways as a public utility—and in the broadest sense that is what they are—they are the best dollar-for-dollar value in the field. But how many of our citizens know this? I think they should be told.

How many citizens are aware that they are paying more for insurance on their cars than for the highways upon which those cars operate? In 1947 the net insurance premiums paid by vehicle owners in Washington totaled \$32,684,619. The total income of the Highway Department from all sources of state revenue was less than half that sum. Ironically enough, the major factor in those high insurance costs is the inadequacy of our highways for modern high-volume high-speed traffic.

Again reducing these figures to the

individual pocketbook, we find the annual insurance cost per registered vehicle in Washington to be \$41.00. The cost of state highways is \$21.84 per registered vehicle. And, incidentally, Washingtonians paid more than \$53,000,000 for liquor last year—more than three times as much as they paid for their state highway system.

Although the state gasoline tax is the principal source of income for state highway departments, few gas-tax-paying citizens know what is done with their contribution after it is made. In my own state I am frequently asked why the gas tax of 5 cents per gallon isn't enough to support the state highway system. As a matter of fact, only about 2 cents of the 5 goes to the support of the state system. The rest goes to cities and counties. But too few of our citizens know that. The number of those who don't know it is growing smaller, however, because Washington is making it her business to inform the public on the basic facts of life regarding their highways. It's a slow, tough job, but it is already paying dividends in a steady increase of public support of a good road program.

I think our citizens are entitled to know that safe, modern highways aren't just expensive luxuries, but solid business investments which will pay for themselves many times over in agricultural and industrial expansion, in increased tourist travel, in time and distance savings to highway users, and in human lives and health.

I think our citizens are entitled to know that their highway systems are not the greedy tax gobblers they are too often thought to be. I think they should know that they are paying less for their highways than for most of the other public utilities which are taken for granted, and that even the heavy overall costs of planned modernization programs would not entail an undue tax burden when reduced to terms of the individual road user's contribution.

Highways Are News

It is my sincere conviction that highway officials are not performing their full duty if they fail to keep the people of their states informed on these matters. Now, more than ever before, highways are big news. Newspapers, radio stations, and other public information media are glad to get the real facts on highways. Not high-pressure propaganda, but facts—facts which speak for themselves and do not need to be colored or distorted. On the same basis, civic groups, public forums, commercial organizations, and similar gatherings are generally glad to hear pertinent highway facts from responsible public officials. These are all ready-made opportunities that must not be overlooked.

I say again, we may well take pride in the planning being done now for the future transportation needs of our states. The program being developed should sell itself, but this is a competitive age, and I suggest that when the plans are completed we sell them to the public—not through high-pressure methods, not through elaborate propaganda, but by telling those who foot the bill what they will receive for their money.

When highway departments begin to do that effectively, I am convinced that the greatest barrier to adequate highway financing—public indifference and inertia—will be eliminated.

From a paper presented at the annual meeting of the American Association of State Highway Officials, at Salt Lake City, Utah, in September, 1948.

Sales Heads for Foster

Two sales appointments are announced by the Foster Trailer Co. of Los Angeles, maker of a line of tilt-type trailers. Walter W. Harvey has been named Head of Retail Sales, and Conrad P. Herman has been named National Sales Manager for distributors and dealers.

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all the way!



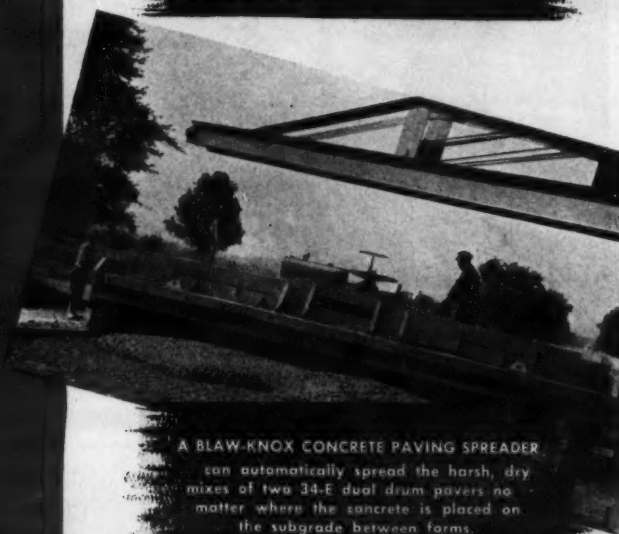
A MULTIFOOTE 34-E DUOMIX PAVING MIXER with its fast charge and discharge gets the concrete on the subgrade in a hurry. The Elevating Boom makes the Multifoot an all-round high-speed construction tool that will eliminate extra equipment and high costs in the pouring of forms.



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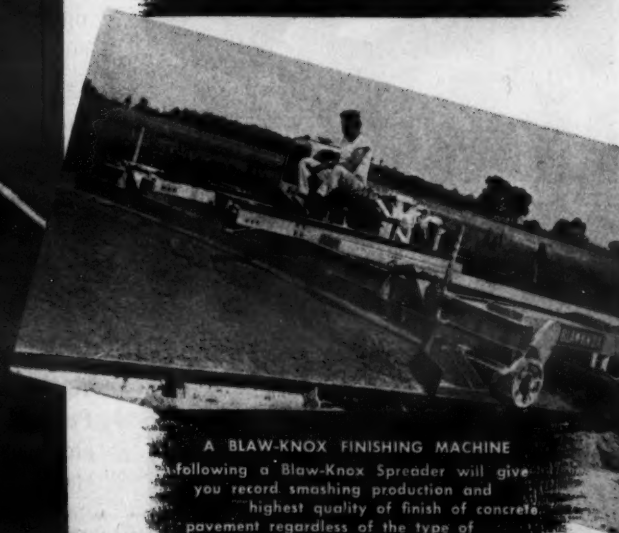
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Safe Control System For Material Hoists

Keeps Tabs on Open Floor Gates, Position of Hoist Platform, Etc., During 30-Story-Building Job

By R. F. EGELHOFF, General Superintendent, Turner Construction Co., Boston, Mass.

THE operation of high-speed material hoists in the erection of tall buildings presents a safety problem which, if not well worked out, may lead to serious accidents and a high accident-severity rate. Partial protective measures will help, but they are poor economy as against complete and positive safety protection.

In the construction of the 30-story Home Office Building for the John Hancock Life Insurance Co. at Boston, Mass., by the Turner Construction Co., a highly efficient and safe control system was developed for material hoists. It combined certain phases of control used in previous operations plus a positive, visual gate-indicator system.

The complete set-up may be termed "the electric gate-latch indicator system". It is made up of the following separate but component systems: (1) a light board which indicates whether any floor gate in the hoist shaft is open or unlatched; (2) a shadow board which shows the location of the hoist platform; (3) a plug-in telephone system for communicating from floor to floor; (4) a plug-in bell system to give operating signals.

Control of Floor Gates

The system which indicates whether floor gates are open or closed consists of gate switches at all floor gates, connected to a light board on the hoist operating floor, within sight of the hoisting engineer. This board (see Sketch No. 1) has on it a red light and a white light for each floor served by the hoist. When a gate is closed, the white bulb only is lighted; and when a gate is open, the red bulb only is lighted. The system shows the hoisting engineer at all times whether any gate is open or closed in the hoist shaft. If a gate is open or unlatched, he is aware of that fact and also knows on what floor it is. A single red light on the board is his warning against any movement of the hoist platform either up or down.

The system is foolproof against burned-out light bulbs, for when a white light goes out, the red light for that floor should go on, and vice versa. If it does not, the hoisting engineer knows that a light bulb is burned out and must be replaced before hoisting operations proceed.

It is impractical to locate this light board too near the hoisting engineer, as the glare from the white lights causes eye strain. Also, it is advisable to locate it near the hoist shaft so that the floor man who controls hoisting operations from the hoist-equipment floor may know at all times where the hoist platform is.

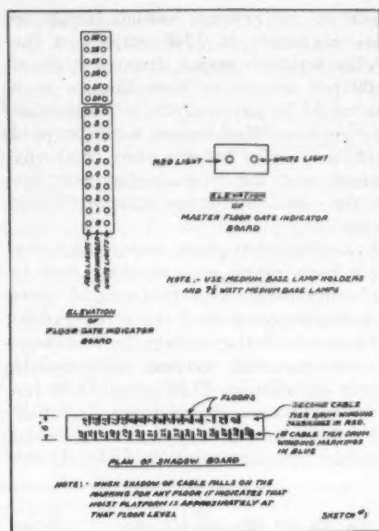
Before going on to describe the next part of the system—the shadow board which shows the location of the hoist platform—it would be well to describe the master floor-gate indicator which is also used. The engineer must watch the shadow board so closely while the hoist is in operation, as we shall see, that he cannot keep his eyes on the floor-gate board; yet it is essential that he know whether floor gates are open or closed. To remedy this situation, a master floor-gate light board with a single white light and a single red light is installed in the hoist engine house (see Sketch No. 1). It is located so as

to be in the engineer's view as he watches the shadow board. This master indicator board shows a white light only when all hoist gates are closed and shows a red light when one or more gates are open. The hoisting engineer does not move the hoist platform when this master board shows the red light.

It should also be noted here that the hoist shaft is completely closed in with wire mesh at all floors. It is therefore impossible for a workman to get within danger range of the shaft without opening a floor gate and thereby warning the engineer.

Control of Hoist Platform

It is essential not only that the hoisting engineer know whether floor gates are open or closed, but that he follow



the movements of the hoist platform in its upward and downward travel. To make this possible, a shadow board is

located in plain view of the engineer, under the cable as it leads off from the hoist drum (see Sketches 1 and 2). By means of a strong light with a reflecting shade, the shadow of the cable as it moves back and forth with the unwinding or winding on the drum is cast on this shadow board. The shadow position of the cable when the hoist platform is at each floor is marked on the shadow board, and the engineer by watching the shadow board knows where the platform hoist is and can follow its travel.

In conjunction with the use of the shadow board, the hoist cable is marked with red or blue paint for about 8 inches at proper intervals, when the shadow of the cable falls on each floor marking on the shadow board. (These markings were located by actual trial.) Near the upper and lower limits of the hoisting range the cable is prominently marked with yellow paint to serve as a warning to the engineer that he is nearing the limits of travel of the hoist.

(Concluded on next page)



Economical operation at full or partial load.



CP Sinker Drill at Benson Mines, Star Lake, N.Y. Photograph through courtesy of Jones & Laughlin Steel Corp.



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These floor markings on the cable are not used actually to set the hoist platform in level position with the take-off level at the floors. To make possible such level setting of the hoist platform, the floor numbers are marked in white crayon on the dogging ring of the hoist. By use of these markings, the hoisting engineer can dog and safely hold the platform hoist in a position level with the take-off floor. The floor markings on the dogging ring are adjusted from time to time to correct for any stretch in the cable.

Telephone Communication

The system as described to this point has to do chiefly with the hoisting engineer and his immediate responsibility in the hoisting operation. However, other personnel are involved: (1) one hoist-control man on the floor or level at which hoisting equipment is located; (2) one man acting as loading supervisor on the floor or level at which materials for hoisting are being loaded onto the hoist; (3) one man acting as supervisor of distribution on the floor or floors where materials are being delivered for incorporation into the structure.

To insure safe and orderly procedure, there must be intercommunication between the upper floors, the floor from which materials are loaded onto the hoist platform, and the floor on which hoisting equipment is located. It is in this connection that the plug-in telephone and the plug-in bell signal system enter into the operation.

The plug-in telephone system is wired to floor stations located at the side of the hoist tower. It permits orders and instructions to be communicated between the supervisor on the receiving floor and the hoist-control man, and between the hoist-control man and the loading supervisor. Each of these three men has a plug-in set and the telephone system can be operated only by them. In actual use the system works as follows.

Mortar is being used, say, on the 10th and 11th floors. The receiving-floor operator covers both floors. He telephones the hoist-control man that mortar is wanted on the 10th floor. The hoist-control man calls to the engineer to make the next delivery to the 10th floor. If but half a load of mortar is required, the hoist-control man telephones this information to the loading supervisor. Thus the hoist-control man on the hoist-equipment floor acts as the clearing house for all instructions and at all times knows just what is going on. The hoist platform is moved only on bell signals and to location as directed by the control man.

Bell Signal System

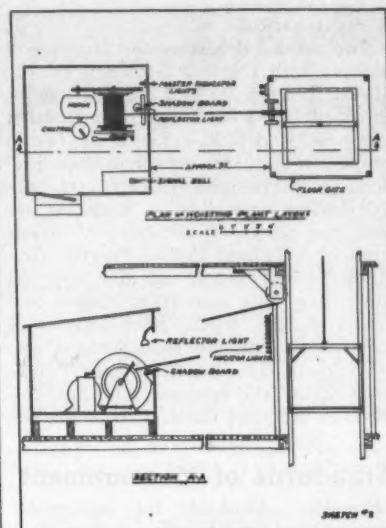
The bell signal system consists of an electric gong located close to the hoisting engineer in the hoist house. These bell signals instruct the engineer to move the hoist platform up or down or to stop the platform at other than a

scheduled stop. Operating signals are as follows: one bell means "stop"; two bells mean "up"; three bells mean "down"; and four bells mean "lower platform slowly".

Electric plug-in stations are located near each floor gate. Plug-in keys with clothespin contact grips are in the possession of the receiving-floor supervisor and the loading-floor supervisor. As signals are given only from the floor at which the hoist platform is located, and only by the supervisors with keys, uncontrolled signaling is eliminated.

It is possible to operate without the control man by having the hoisting engineer receive instructions directly from the receiving and loading floors by use of a head phone. But it is not advisable to eliminate the control man and place additional work and responsibility upon the hoisting engineer when the hoist is in practically continuous operation.

The system in its entirety, as described, operated with marked success on the John Hancock Building to in-



sure safety and to produce greater efficiency in hoisting materials. The workmen directly connected with the materials-hoisting operation have felt

a sense of security owing to the safeguards which the system provides, and as a result their production has been very good. The cost of installing the system and maintaining it has been offset many times by the benefits which resulted from its use.

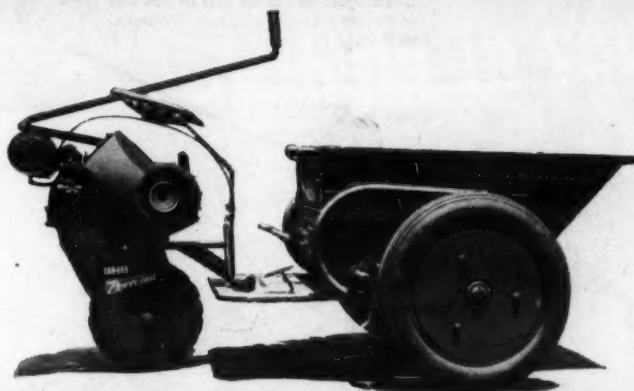
Reflectorizing Beads

Glass beads for paints used on traffic lines and markers are described in a folder prepared by the Flex-O-Lite Mfg. Co., St. Louis 3, Mo. In addition to describing the Flex-O-Lite beads, the folder contains a sample of them and a beaded panel for testing their reflective qualities.

The folder lists several uses for Flex-O-Lite for signs and paint stripes, tells how the beads are applied, and explains why they reflect light. It also lists the sizes, coverage, and packaging of the Flex-O-Lite beads.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 53.

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Designed in accordance with proven engineering principles, the Power-Cart is designed to LAST. GAR-BRO Mfg. Co., 2416 E. 16th Street, Los Angeles 21, California.

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KIM Hotstart preheats engines, makes them start instantly, regardless of weather.

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The new Wooldridge Model BB-85 scraper has a struck capacity of 8.5 cubic yards; heaped capacity is 11 yards

Scrapers and Dozer For High-Speed Work

Three new models of cable-controlled earth-moving equipment are available from the Wooldridge Mfg. Co. of Sunnyvale, Calif. These include the Models BB-85 and BB-120 four-wheel scrapers and the BHD-19 bulldozer. The bulldozer is designed for use with the Allis-Chalmers HD-19 heavy-duty tractor.

The BB-85 scraper has a struck capacity of 8.5 cubic yards and a heaped capacity of 11 cubic yards; the BB-120 has a struck capacity of 12 yards and a heaped capacity of 14.2. Both units have a front-apron opening of 60 inches. Among the features claimed for these Wooldridge rubber-tired scrapers are rear-draft fulcrum leverage, pivot-tilt bowl, higher yoke clearance, increased ruggedness, and easily accessible cable reeved in straight lines without reverse bends. All sheaves are mounted away from dirt and the load. The BB-85 can be equipped with four 16:00 x 20 or 14:00 x 20 tires. It has a shipping weight of about 16,000 pounds. The BB-120 can be equipped with four 16:00 x 24 or 18:00 x 24 tires. It has a shipping weight of about 19,500 pounds.

The BHD-19 bulldozer is designed for rugged service in straight bulldozing operations. The moldboard is formed from 1-inch plate and is gusseted to withstand tough service. The 1-inch blade is mounted on a box-section base and is also gusseted. The removable blade tips are made of 1-inch manganese-molybdenum alloy. The push arms are fabricated from formed channels, and are telescoped for knock-down shipment. The cable to the power-control unit is guided along the side of the tractor frame. Shipping weight of the bulldozer is 8,200 pounds.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 66.

Water-Ejector Valve

A moisture-ejector valve for use with stationary air compressors and air-brake systems has been developed by Monroe Standard, Inc., Wyandot Bldg., Galion, Ohio. Of the port-and-piston type, it is said to eject all water, oil, or sludge from air-compressor storage tanks. It is made of bronze and has reinforced Neoprene cups.

The Pelton valve is designed to operate automatically each time the compressor cuts in or out; motive power is furnished by the tank pressure. Its self-cleaning action is said to prevent carbonization of working parts. Among the advantages claimed for the Pelton valve are these: that it eliminates frozen or clogged systems, and that it extends the life of air-system diaphragms, regulators, and other parts.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 54.

Catalog on Snow Plows

A 4-page catalog about the Walsh-Sargent Trip-One-Way snow plows has been put out by the Walsh Holyoke Boiler Works Division, Appleton St., Holyoke, Mass. Walsh manufactures these plows under an agreement with the Maine Steel Co., manufacturer of the Sargent overhead crane and the

Sargent backhoe.

The catalog describes the Model X-1 for use with 1½ and 2-ton trucks; the Model X-2 for 2½ and 3½-ton trucks; the Model X-3 for 3½ to 6-ton trucks; and the Model X-4 for 6 to 10-ton trucks. It provides complete specifications on dimensions, weights, and control devices, as well as on wings for use with the plows. Walsh-Sargent wings come in 9, 11, and 13-foot lengths. Additional information on the tripping sub-frame tells how it is hinged and bolted to the truck, how contact is maintained with the road surface, etc.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 69.

Standards of Measurement

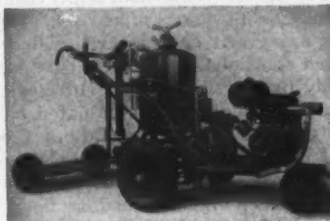
Precision standards for measuring mass, volume, and length are described in a 28-page catalog distributed by W. & L. E. Gurley, Station Plaza, Troy, N. Y. Items listed in Bulletin No. 1500 include standard weights and weight

sets, standards of liquid volumes, measuring tapes and machines, precision balances, and other miscellaneous equipment and accessories.

The bulletin contains information on tolerances allowed by the National Bureau of Standards. It describes the

various weight systems, and how to convert from one to the other. It also tells how Gurley equipment is manufactured and accuracy maintained.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 119.



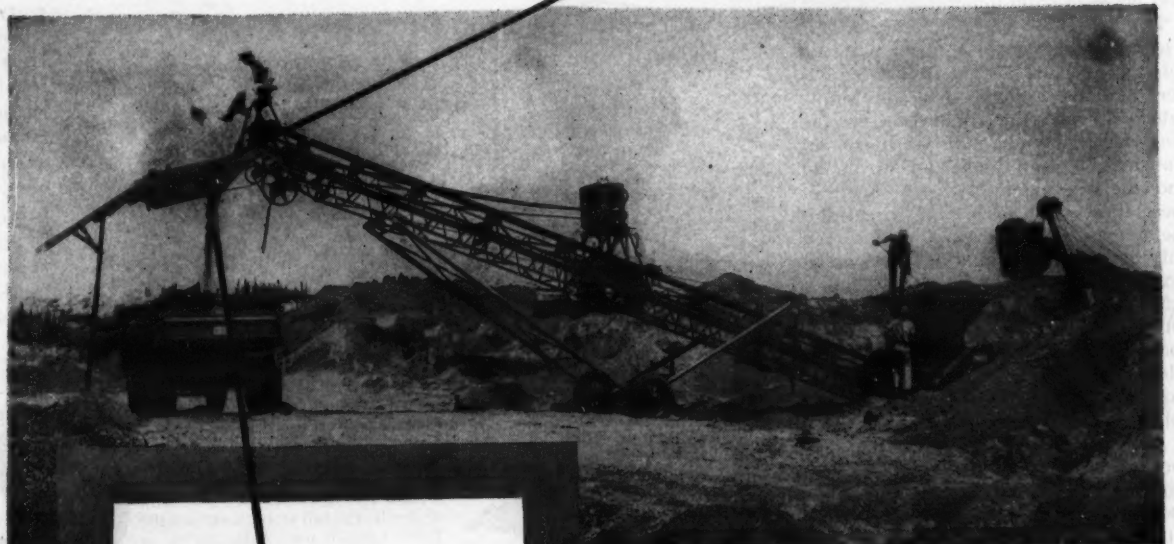
All-Purpose Striper Solves Zone-Marking Problem

Self-propelled and completely self-contained, designed to meet the needs of state and county highway departments, municipalities and airports for accurate high speed striping.

Clean-cut, attractive lines are assured with K-C Air Curtains. Air actuated traction up to 5 MPH with a trailer for the operator. Truck mounted and other models available for all requirements. Write for folder.

KELLY-CRESWELL CO., Xenia, Ohio

THE PIONEER BUZZER is a small, compact screen that attaches to the delivery end of a conveyor. 18 square feet of live wire screen produce about 50 tons of material an hour.



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Low-cost

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The Pioneer Buzzer Screen
The Pioneer Hydraulic Conveyor Truck
with Conveyor and Feeder

Together, they're one of the sweetest portable screening and loading plants you've ever seen. Hauled behind a truck, set up anywhere in twenty minutes, produce as much as 500 tons of specification gravel in a day.

Want more information about this profitable pair? Then, write today for complete details about Pioneer's new Buzzer Screen and the Hydraulic Conveyor Truck.

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IN NINE MINUTES, one man can easily elevate a 50' conveyor with this new Pioneer Hydraulic Conveyor Truck. A twist of a valve and it's back in its cradle... ready for another move. Handles conveyors up to 50' in length with belts as wide as 30". A reciprocating plate feeder mounted on the conveyor completes the plant.

BUY BOTH!

Higher Output,
Lower Upkeep!

Pioneer
Continuflow EQUIPMENT

Sub-Base Crushed For Road Project

Limestone Is Quarried, Crushed to Size, Hauled, And Processed to Build Granular Highway Base

CONSTRUCTION of a granular sub-base 4 inches thick under a concrete pavement was one of the important features of the Koss Construction Co. subcontract on U.S. 40, near Foristell, Mo. (See page 5.) About 30,000 tons of crushed limestone was required, and this material had to be quarried, crushed, hauled, and processed.

Tobin Quarries, Inc., of Kansas City, Mo., produced and delivered the 1-inch-minus material. Koss crews and equipment did the processing and compacting.

Rock Quarry

Tobin opened a limestone quarry about a mile south of the job and 3 miles from its eastern end. Two Gardner-Denver wagon drills, powered by Worthington and Ingersoll-Rand 315-cfm compressors, drilled the necessary blast holes. A maximum of 24-foot steel was used, and most of the holes went down from the top of the ledge on 5 x 6-foot staggered centers. Some exceptionally hard limestone was found near the quarry floor, and this formation was snake-holed by the drills, working from the bottom.

Each hole was then loaded with 30 to 35 sticks of du Pont Gelex No. 1 powder, with a No. 6 electric blasting cap in the bottom. The shots were pulled at the end of a shift with an electric blasting machine.

The broken rock was scooped up by a Bucyrus-Erie 22-B and a Koehring 304 shovel, and loaded to three 4-yard dump trucks which hauled the material about 200 feet to the primary crusher.

Rock Crushing

Rock-crushing facilities included a 32 x 40-inch Cedarapids primary jaw crusher and feeder, and a Cedarapids Pitmaster plant with a hammermill to reduce the limestone to small size. Specifications called for 1-inch-minus material, with the mix heavy on the fine side.

Both plant units were set up adjoining each other, and the limestone moved in a continuous run through both plants. Rated capacity of the equipment is 150 tons per hour, and the actual output was very close to that figure—never under 120 tons per hour. The crushed limestone was delivered by conveyor to a 40-ton transfer bin. From there two dump trucks could haul the material out to the big stockpile.

Much of the crushed rock, however, was hauled directly to the job from the transfer hopper by a fleet of 9 or 10 dump trucks. Tobin's subcontract called for the delivery of the material on the site, and the dump trucks were handled at that point by a dump-man on the Koss payroll. A state inspector also checked the approximate content to make certain the correct volume was put in.

Hot SC-2 asphalt, applied by a pressure distributor at the rate of 1 gallon per square yard, preceded some of the sub-base. However, much of the material was laid on compacted-earth sub-grade. When the trucks had dumped the correct amount of material, Koss used a Caterpillar No. 12 motor grader to cut the material out of the windrow and road-mix it with water.

Tank trucks applied the mixing water in light shots as the motor-grader blade mixed the material. When the optimum moisture content was mixed in, the granular material was then re-laid in



C. & E. M. Photo

This is the Tobin quarry which supplied limestone for the Koss Construction Co. sub-base contract. A Koehring shovel and a Bucyrus-Erie shovel load rock in the foreground. Up on the ledge a Worthington compressor and Cleveland drill are working.

2-inch lifts. Each lift was thoroughly rolled by a pneumatic-tire Bros Wobble Wheel roller, and final compaction was done by a Huber 8-ton tandem machine. A blade grader traveled just

ahead of the smooth roller to dress the surface.

Careful checks were made against engineers' grade stakes set for this material, in order to bring the sub-base as

close to its final shape as possible. The granular material, paid for by the ton, had to check out very close to volumetric content.

Construction of this dense flexible sub-base under the concrete pavement, it is believed by the engineers, will give added bearing value to the pavement itself by preventing pumping, and will prolong its life. But until the final answers are available on all the sub-base test sections on the project, no accurate estimate can be made by any of the men as to the value of the work.

Consultant to LeTourneau

Hans A. Bohuslav has been appointed a special engineering consultant to R. G. LeTourneau, President of R. G. LeTourneau, Inc., of Peoria, Ill., and Longview, Texas. Mr. Bohuslav comes to LeTourneau from Engineering Controls, Inc., of Los Angeles, Calif., where he held the position of Vice President in Charge of Engineering and Production.

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for lower costs

Preformed "Blue Center" Wire Rope lasts longer...

ROPE THAT STAYS on the job longest saves you wire rope dollars; brings fewer shut-downs; cuts down replacement time. And Roebling Preformed Lang Lay "Blue Center" Steel Wire Rope gives you exactly these money-saving features... One big reason for this superiority is "Blue Center" Steel specially developed for wire rope and made only by Roebling. Another big reason is the Roebling Preformed construction with its unique service advantages.

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Roebling Preformed is easy to handle and install because it is relatively inert and doesn't tend to set or kink. It can be cut without seizing, and fittings are more easily applied. In operation, Preformed gives outstanding life despite severe bending, and particularly where small sheaves and reverse bends occur.

FREE ENGINEERING SERVICE

Call on your Roebling Distributor for help in selecting the right wire rope for longest service and rock-bottom cost. If you have specially tough problems in wire rope selection, installation or maintenance, your Distributor will be glad to secure the assistance of a Roebling Engineer. John A. Roebling's Sons Company, Trenton 2, New Jersey.

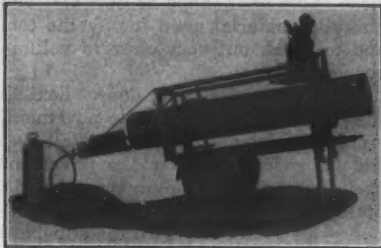
WRITE OR CALL THE ROEBLING FIELD MAN AT YOUR NEAREST ROEBLING OFFICE AND WAREHOUSE

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ROEBLING

A CENTURY OF CONFIDENCE





The Tarco heater for drying and heating sand, gravel, and stone is mounted on a rubber-tired chassis for portability. It has a retractable drawbar and telescoping legs.

Heating, Drying Unit For Sand, Stone, Etc.

A portable unit for drying and heating sand, stone, or gravel is made by the Tarrant Mfg. Co., Jumel Court, Saratoga Springs, N.Y. Heat is introduced into the Tarco unit by a kerosene-burning torch. A gasoline engine revolves the heating drum at a speed sufficient to insure the delivery of a steady stream of hot, dry material, the manufacturer states.

The Tarco heater is mounted on a two-wheel rubber-tired chassis, and is equipped with telescoping legs and a retractable towbar. It is 10 feet 7 inches in length, 6 feet 1 inch in height, 3 feet 10 1/4 inches in width, and weighs 742 pounds. The retractable drawbar extends 35 inches.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 61.

Metal-Cutting Saw

A band saw for all metal-cutting operations is manufactured by the Johnson Mfg. Co. of Albion, Mich. It is designed for wide application in the equipment-maintenance shops of contractor, engineer, or equipment distributor. As a special feature, it operates and shuts itself off automatically after completing a cut.

The Johnson horizontal metal cut-off band saw will handle round bars up to 10 inches in diameter and flat objects up to 18 inches wide. A quick-acting vise is said to be instantly adjustable for various widths. A lever moves with the jaws—which will swivel through 45 degrees—to any desired position. The saw has a 4-speed drive, a bolt-action stock stop which allows the cut portion to fall clear of the blade, a ball-bearing 1/2-hp electric motor, and a three-legged stand equipped with casters for easy change of location.

The Johnson saw blade measures 11 feet 5 inches x 3/4 x 0.032 inch, has an overall height of 39 inches, and requires a floor space of 66 x 31 inches. It has an approximate weight of 750 pounds.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 16.

Construction Equipment

A line of construction equipment is described in a 32-page catalog issued by the Gar-Bro Mfg. Co., Division of Garlinghouse Bros., 2416 E. 16th St., Los Angeles, Calif. The Gar-Bro line includes concrete-handling machinery, concrete buckets, wheelbarrows, power carts, standard carts, and other miscellaneous equipment.

The catalog pictures each type of equipment, showing its construction and job applications: the Gar-Bro semi-portable hoppers which are made in four styles, each with a 3-cubic-yard capacity; the portable hoppers made in four styles, each with a 4-cubic-yard capacity; a hopper for use on the bodies of dump trucks; hoppers for receiving concrete; concrete-floor hoppers; collection hoppers; weighing hoppers; and others. Concrete-handling equipment shown includes buckets, towers, elephant trunks, lay-down buckets, wheel-

barrows, concrete carts, mortar boxes, etc. Also described in Catalog No. 75-B are the Gar-Bro power cart, splicing rigs for wire rope, the Gar-Bro Shindle for wire rope, and wheels for carts, wagons, and wheelbarrows.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 64.

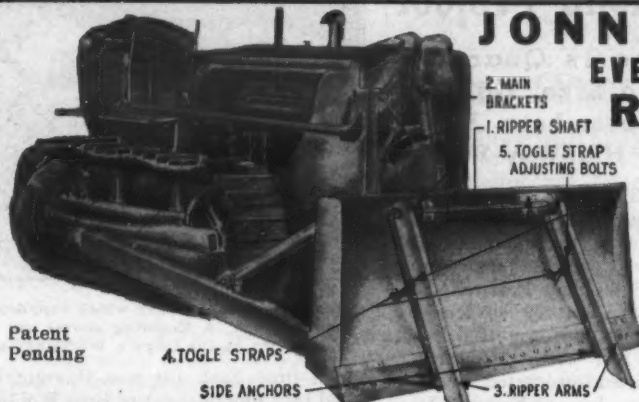
Light Building Materials

Results of research conducted on cement-bonded construction and aggregate materials have been made available by Hobart Publishing Co., Inc., Box 1427, Chevy Chase Branch, Washington 15, D.C. The object of the study was to learn the physical characteristics of a number of compositions containing cement-bonded aggregates; to study lightweight plastic compositions having a lattice of fibrous material, a binding matrix of portland cement, and a chemical admixture; and to see if these materials could be formed into sheets or panels for use in construction.

The 200-page technical study, entitled "Properties of Assorted Light Weight Aggregate Materials", includes details on the most promising materials

and the most successful tests.

Although it is a Government report, printed copies are available only from Hobart at a cost of \$7.50 each.



Patent Pending

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A \$1000.00 Ripper as low as \$45.00. Made in 4 sizes to fit any dozer and controls. State H.P. and HEIGHT of dozer blade. Free Booklet. Dealers wanted.

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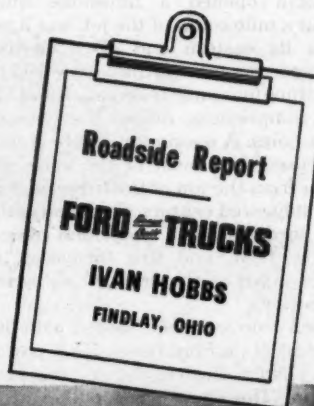
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50 to 70 \$75
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Rentals
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Minimum
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"My FORD is the BEST truck I ever OWNED"



"MY F-7 FORD dump truck has already given me 7,000 miles of top service, and I haven't babied it either," reports Ivan Hobbs who uses his truck in construction work in the Findlay, Ohio area.

"My usual load is 18,000 lbs. of crushed stone and my hauls are under all kinds of conditions. My Ford is the best truck I ever owned and I bought it because my previous Ford Trucks lasted longer and cost me less to operate."

Thus does Mr. Hobbs add his voice to a nationwide chorus of Ford Truck enthusiasts. Truck users everywhere are pepped up about Ford Truck performance. They love the luxury of the new Ford Million Dollar Cab. And they get the biggest bang out of Ford Bonus Built construction . . . the superstrong construction that contributes to long truck life. Life insurance experts prove Ford Trucks last longer.



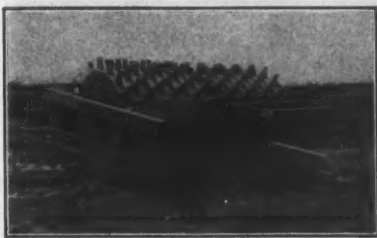
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USING LATEST REGISTRATION DATA ON 5,444,000 TRUCKS,
LIFE INSURANCE EXPERTS PROVE FORD TRUCKS LAST LONGER!

ONLY THE FORD BIG JOB HAS ALL THESE FEATURES!

- ★ New 145-h.p. Ford V-8 engine for top performance.
- ★ Ford exclusive concentric dual-throat carburetor for more power, more economy.
- ★ New heavy duty 5-speed transmissions for operating flexibility.
- ★ Big Ford 16-inch by 5-inch rear brakes in the F-8; 16 1/2-inch by 3 1/2-inch in the F-7.
- ★ Ford Super Quadrax 2-speed axle with vacuum shift for performance flexibility in Model F-8 (single speed axle also available); single-speed Quadrax Hypoid Axle in Model F-7.
- ★ Large diameter (10-inch) wheel bolt circle with 8 studs to allow for extra-strong hub construction.
- ★ Million Dollar Cab with Ford Exclusive Level Action suspension for greater driving comfort.
- ★ Nationwide service from over 6,400 Ford Dealers.
- ★ Ford Bonus Built construction for long truck life.

Gross Vehicle Weight Ratings: F-8 up to 21,500 lbs., F-7 up to 19,000 lbs. Gross combination ratings: F-8 up to 39,000 lbs., F-7 up to 35,000 lbs.



Ground pressure can be varied from 218 to 670 psi with the new Model 144 Tournapacker by filling the drums with water and loading boxes with sand.

Water-Filled Roller Exerts Up to 670 PSI

A variable-weight sheepfoot roller is announced by R. G. LeTourneau, Inc., Peoria, Ill. Ground pressures can be varied from 218 to 670 psi with the Model 144 Tournapacker—by filling the drums with water and loading attached boxes with sand.

The Tournapacker's self-cleaning feet are made from tempered tool steel. They have a square base which tapers off to a round tamping surface of 8 square inches and they will not kick up compacted dirt, the manufacturer states. There are four feet in a row, and 144 feet on each of the two drums.

Overall measurements include: length, 16 feet 9½ inches; width, 13 feet 7½ inches; height, 6 feet 4½ inches; empty weight, 14,000 pounds; weight when loaded with water, 27,300 pounds; and weight when loaded with water and sand, 42,883 pounds. LeTourneau also manufactures a Model 108 Tournapacker which has 108 feet per drum, and is designed to provide compaction pressures of up to 900 psi.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 72.

Heat Straightens Warped Steel Beams

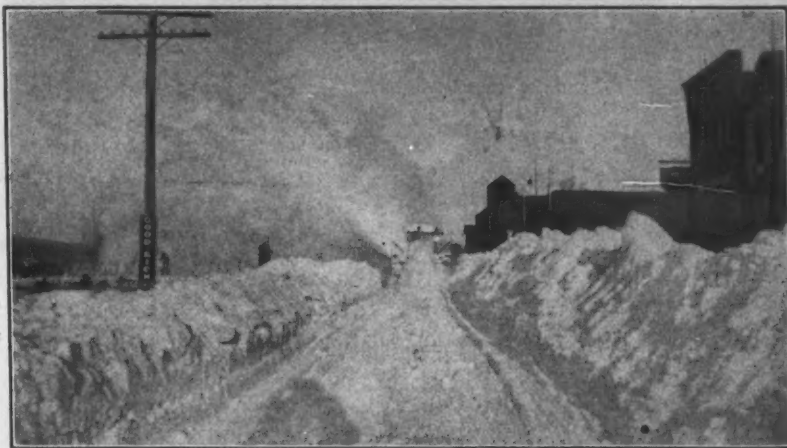
Quick thinking on the part of a contractor's trouble shooter recently saved about \$20,000 and allowed a construction job to go ahead on schedule. The ace trouble shooter in the case was Urban D. (Gus) Gosselin; the contractor, F. H. McGraw & Co. of New York City; and the job, a drier plant of the General Aniline & Film Corp., which was being built at Rensselaer, N. Y.

The steel beams used in the construction had clip angles welded to them at the fabricating plant. The angles were to receive and provide expansion space for a glass-block wall. Welding of these clips had caused a horizontal warp of from ¾ to 1½ inches in fifty of the beams. Since the steel frame was complete and the brick work in progress, it was necessary for Gosselin to devise some method of straightening the warped beams on the job; the only alternative was to dismantle them and send them to Albany, N. Y., for straightening in a heavy press. The beams were 18-inch 55-pound I-beams and 15-inch 33.9-pound channels. They were used as outside lintels and had a continuous span of 22 feet.

Gosselin decided to try some applied thermo-dynamics. If the beams were warped by heating, he reasoned, why wouldn't heat drive them back into shape? So he had two men apply heat with oxyacetylene welding torches to one of the beams at the mid-point—the idea being that the stresses developed by the heat would produce a force that would bring the beam back into its original shape. Gosselin had the torches focussed on the mid-point on both the upper and lower sides of the bottom flanges, and held there for 60 seconds. At the same time, every effort was made to contain the heat patch so as to control the push. The beam was heated to between cherry-red and white heat. In a matter of minutes, Gosselin reports, it went back into position with a noticeable jump. Using

piano wire as a line, he checked the results and found that his method had worked satisfactorily. The beam was once again true.

The method varied on the different beams only insofar as the degree of warp varied. Where the warp was between ¾ and 1½ inches, heat was applied to the mid-point only. On sections where the warp was greater, the treatment required subsequent applications to the quarter points. In applying this method, Gosselin cautions, special care must be taken not to use a cutting torch, as the accidental opening of the cutting valve would instantly cut a hole in the beam. He also points out that the best way to avoid the possibility of warping is by stitch welding—that is scattering the welding so as to prevent a concentration of heat in a certain area.



N. Dak. Highway Dept. Photo
This shot of a Snogo clearing the main street of Glen Ullin, N.Dak., gives some idea of the snowfall in that state, and the way it can choke traffic.

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Ultimate Hook
Capacity 57,000 lbs.

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For Heavy Duty
Ultimate Hook
Capacity 92,000 lbs.

The SUPER
No. 430
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Ultimate Hook
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FOR EVERY PURPOSE...

McKISSICK BUILDS A BETTER BLOCK

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Part of Seattle Photo

Model of the new administration building at the Seattle-Tacoma Airport. Lease & Leigland is the prime contractor on the job.

Airport Gets New Terminal Building

Air-Traffic Knot Untied At Seattle-Tacoma Airport; Modern New Administration Building Is Erected

(Photo on page 1)

ONE of the finest modern administration buildings to be found anywhere on an American airport is the new building now under construction at the Seattle-Tacoma Airport about 10 miles south of Seattle near U. S. 99. Here a new \$3,000,000 modernistic terminal building with 234,000 square feet of floor space is being built to meet ever-growing air-transport needs of the Pacific northwest.

When the building is completed next May, it will provide complete terminal facilities for an airport that is considerably larger than usual for a city the size of Seattle or Tacoma. For Seattle is the jumping-off place for Alaska and the Orient, and the huge four-engine planes that use the airport will be carrying more and more international passengers. They will need to use ticket counters, public dining lounges, various unique shops and services, operations and administrative offices, as well as government offices for customs, immigration, ATC activities, weather information, communications, and the Civil Aeronautics Administration.

The airport is being financed jointly by the Port of Seattle Commission and the CAA, with more than two-thirds of the job financed by the former. The three prime contracts now under way will complete the terminal building and a 120-car underground parking garage. Lease & Leigland, general contractor of Seattle, has a \$2,190,025 job for the building and the parking garage. I. G. Navarre & Son of Seattle has the \$349,779 contract for heating, plumbing, and ventilating. The \$215,722 contract for electrical work is being done by the Agutter Electric Co. of Seattle.

Numerous smaller subcontracts have also been awarded on many of the special items, such as terrazzo flooring, glazing, and so on.

Design of Building

The building was designed by the Port of Seattle Commission under direction of George T. Treadwell, Chief Engineer. Some of the drawings were detailed in the field, and H. A. Moldenhour, the Supervising Architect, has been stationed in the field office to keep plans and details well ahead of construction.

The new building is primarily a reinforced-concrete job. Approximately 12,000 cubic yards are being placed in the terminal building and garage. Because

connected with forming and supporting many of the pours, none of which was over 350 cubic yards.

There are seven stories in the building, and the new control tower for the field will be high above the ground. Concrete driveways will bring automobiles and taxis to the front of the building. For those passengers who want to leave their automobiles parked at the field while they make a short week's trip, the underground garage will serve. This building, incidentally, will not be visible. The garage will be covered with backfill, landscaped, and seeded.

The plywood-formed concrete surface of the outside of the administration building will be painted white after concrete work is done. Standard roofing material will be laid over the top of the concrete.

Inside, the terminal will be the last word in modern luxury. A great glass window 38 feet high x 160 feet long will permit people in the main concourse to look out at the loading apron adjoining the airfield side of the building.



C. & E. M. Photo
H. A. Moldenhour (left), Supervising Architect on the terminal-building job at the Seattle-Tacoma Airport, and Resident Engineer Lester G. Hall confer on the steps of the field office.

Throughout the first floor and lobby there will be terrazzo floors. There will (Continued on next page)

TWO-WHEELED TORNADO

Combining lightness, strength and efficiency, this Blue Brute 105' Compressor is built for long years of trouble-free service. And exclusive Feather* Valves get all the air power out of every drop of fuel. Other Blue Brute Compressors from 30' to 500'.

*Reg. U. S. Pat. Off.

Owner: Plainfield Water Co., Plainfield, N. J.



Owner: Daniel O'Connell's Sons, Inc.
Holyoke, Mass.

FAST, DEPENDABLE PICK-UP

Newest product of Worthington's over 100 years of pump-making, the Blue Brute Contractor's Portable Centrifugal Pump has built-in self-priming and plenty of reserve power. Pneumatic-tired, steel wheels, or base mounted, in a complete range of sizes.



PROFIT-PACKED POWER

Tough, fast-hitting Blue Brute Paving Breakers are light in weight, easy to operate, and do a lot of hard work on very little air. Blue Brute Air Tools also include Hand-Held Rock Drills, Clay and Trench Diggers, Tampers, Sheeting Drivers and Wagon Drills.

Owner: R. W. Meyer, Cadillac, Mich.



Owner: J. J. Romano, Bound Brook, N. J.

QUICK SPOTTING ... MIXING ... DISCHARGING

In Blue Brute Portable Concrete Mixers, many advanced features, including Ransome's famous mixing action, add up to more concrete at lower cost. Sizes: 3 1/4 (Tilter or Non-Tilter), 6, 11 and 16 cu. ft. Gasoline engine driven or electric power.



BUY BLUE BRUTES

WORTHINGTON

Worthington Pump and Machinery Corporation, Worthington-Ransome Construction Equipment Division, Holyoke, Mass. • Distributors in all principal cities
Your nearby Worthington-Ransome Dealer has the complete line of Blue Brute Construction Equipment. Write for his name.



IF IT'S A CONSTRUCTION JOB, IT'S A BLUE BRUTE JOB



At left: column steel is in place on a section of the new Seattle-Tacoma Airport terminal building. Steel forms will be lowered over the reinforcing and bolted in place, then the pour will follow. In the middle photo, workmen finish pouring a slab—notice the Mixermobile tower behind them. At right, a Lorain truck crane hoists a load of form lumber to the top of the building.

be cast terrazzo slabs on stairways. In the post-office area in the building, special wood-block floors are to be constructed.

On the walls will be glazed tile and ceramic veneer. It is one of the largest ceramic-veneer jobs ever seen in the Pacific northwest. There will be colored glazed tile in the rest rooms, and standard glass-block lighting in various other parts of the building.

The ceramic-veneer order is being supplied by Gladding-McBean & Co. The 7 $\frac{3}{4}$ -inch square Insulux glass blocks are being furnished by Owens-Illinois Glass Co. Washington Brick & Lime Co. of Spokane is supplying glazed block work, and the aluminum window sash is being furnished by Seattle Bronze Co.

Lighting in the new building is to be of the overhead type, with some indirect fixtures. Three large boilers will supply warm-air and hot-water heat. In a building of this kind there will, of course, be a complete public address system, and there will even be a complete vacuum-cleaning system installed as a permanent part of construction.

To design the building to conform to its outline, it was necessary to cantilever many of the stairways and canopies, all of which added to the concrete problem of Lease & Leigland, the main contractor.

An Early Drainage Problem

The building foundation, laid on hardpan, had already been placed under a previous contract when Lease & Leigland moved in with crews and equipment on October 15, 1947. An early autumn rainy season was in full swing, however, and it was soon apparent that headache number one was the problem of drainage.

The new administration building is located in the lowest part of the field, and when the foundation site for the new underground garage was opened up, it was a natural drainage sump. Rains falling on the field drained right down into the construction area, carrying a silt load which filled in around forms and was generally troublesome.

Several Rex pumps were then brought in, and long discharge lines were laid away from the garage site. The pump suction lines were placed in local sumps dug within the construction area.

It was slow, messy, muddy business, but the steel forms for support columns were set and the columns poured as

rapidly as possible. About 5 feet of earth backfill then went into the garage
(Continued on next page)

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for every job!

BULLDOZERS & TRAILBUILDERS

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DUMP BODIES

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SCRAPERS

BOTTOM DUMP WAGONS

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CONSTRUCTION MACHINERY DIVISION

Southwest Welding & Manufacturing Company

ALHAMBRA, CALIFORNIA

**ATLAS
CONCRETE
FORMS**

WALLS • CYLINDERS • FLOORS • SEWERS

Irvington
FORM & TANK CORP.
Irvington, N. Y.



Looking down over Lease & Leigland's contract at the Seattle-Tacoma Airport (above), we see the job batch plant and the carpenter yards and shed. At right, workmen set forms and a steel-braced runway to pour part of the control tower.



C. & E. M. Photos

Airport Gets New Terminal Building

(Continued from preceding page)

under the floor slab. When the job is done, the grading and landscaping will cure the drainage problem around the new building.

Concrete Forms

Fabrication of concrete forms was the biggest part of the job and represented the majority of man-hours expended by Lease & Leigland. Because of the intricate layout of many parts of the building, it was necessary to prefabricate the forms in a carpenter yard, where they could be laid out to full scale.

An outside carpenter yard as well as a roofed-in carpenter shop was erected. Power equipment around the shop and yard consisted of two DeWalt outside saws, two Delta Unisaws, a Delta band-saw, a Delta jointer, a Delta tilting-table saw, a DeWalt radial saw, 12 portable SkilSaws, a Foley saw gummer, a power grinder, a Foley band-saw setter, and a Foley band-saw filer.

Specifications called for all exposed form work to be made of plywood facing. The plywood was brought in to the job by truck, unloaded at a storage area, and dipped in a vat of form oil to give the sheets extra life. Other lumber—shiplap, shoring, and heavier members—was unloaded outside and used as needed. The job was planned so that lumber could be used and re-used until it was so cut down it had to be consigned to the scrap heap.

Working far into the night almost every night when the job was new, General Superintendent Ernest Kissee and his assistants drew up detailed plans of sectional form work. These plans were then submitted through Mr. Moldenhour, and approved by the Port of Seattle Commission. As fast as the plans were drawn, they were sent out to the carpenter shop, usually accompanied by the contractor's engineers, who often assisted in the tricky layout work.

When the form panels were finished, they were loaded on a truck and sent over to the building, only 500 feet away. There a Lorain truck crane, carrying an 85-foot boom and a 15-foot jib, picked the panels up and hoisted them to their location. Minor fitting and adjusting was done, and the forms were tied together with steel form rods.

The cantilevered sections and slabs had to be supported from underneath. Fir 4 x 4's were generally used for shoring and caps, with a maximum spacing of 6 feet. Many of the narrow beams were supported by 2 x 8's, with a 2 x 4 nailed on either side and laid narrow side down.

Forming was full of many individual problems, but none were so bad that they could not be solved by laying a section to full scale and building it on the ground. One peculiar pour contained a staircase, a handrail, a section of slab, and two beams. The only way

to form it was monolithically.

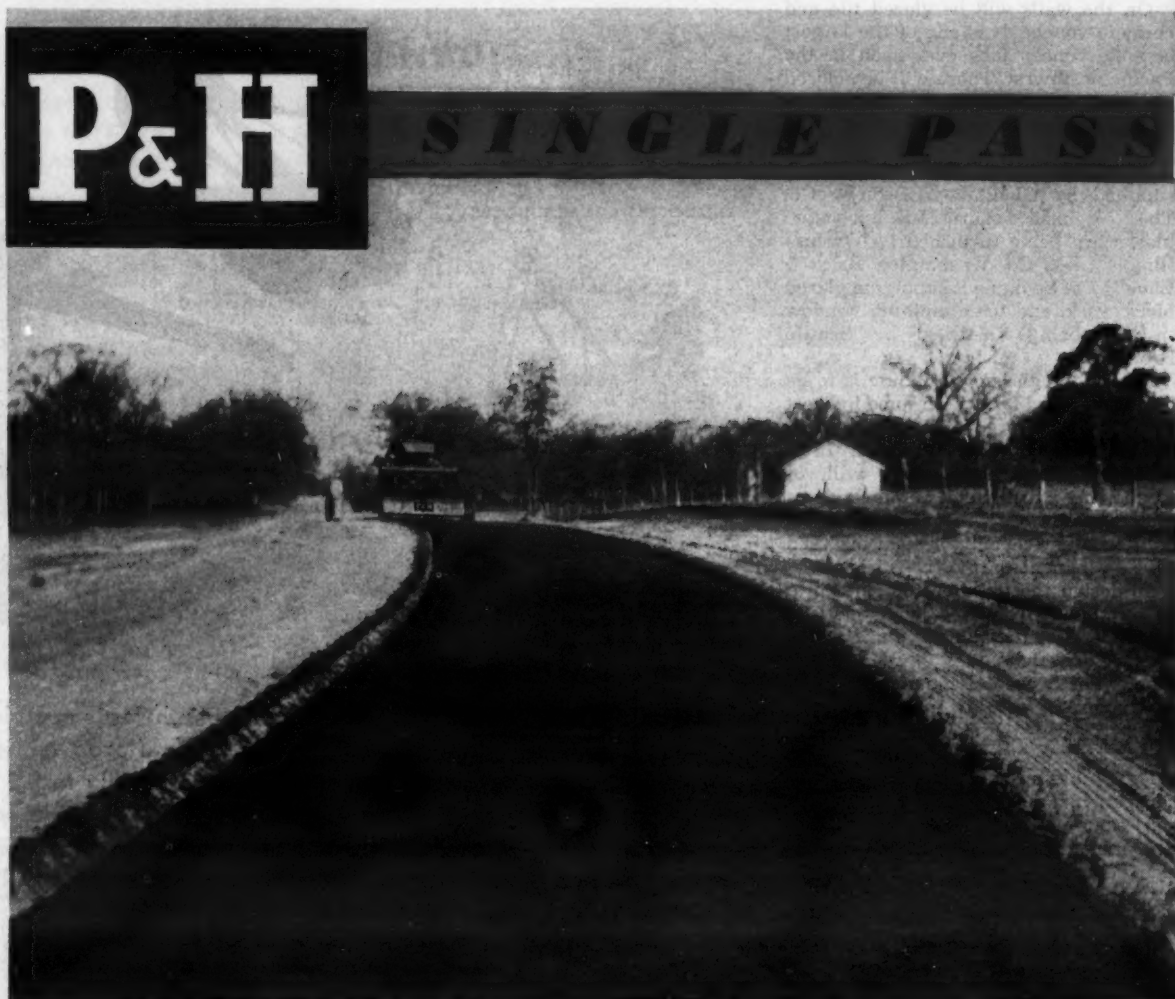
Concrete Pouring

Exceptionally heavy steel reinforce-

ment was typical of the administration building. It was often difficult to get all of it in the forms, so it can be imagined how hard it was to pour concrete.

Two batch trucks, each carrying two 2-yard batches, shuttled back and forth from the job batch plant. For the lower

(Concluded on next page)



One machine

**PROCESSES 8,000 sq. yds. daily
ON TEXAS PROJECT!**

On this soil-bituminous state highway in Texas, a P&H Stabilizer with one operator processed on an average 8,000 square yards per day in a single pass.

This highway, over 7½ miles long, and 20 feet wide, was processed to a depth of 6 inches. Maximum production often reached 1,200 square yards per hour!

There's little that's unusual in the speed of this Texas job. Such reports are being received from all over the country — where P&H Single Pass Soil Stabilizers are at work building excellent, all-weather surfaces more quickly.

Making maximum use of in-place materials, the P&H Stabilizer performs with accurately predetermined results, all 8 basic requirements of soil stabilization — and does it with any type admixture and at a rapid pace. Full information mailed on request.

pours a Wagner Mixermobile was used. Mixing water was piped to the job site from the airport supply, and transferred to the Mixermobile through a rubber hose. Mixing time was 1 minute.

The Mixermobile discharged to a hopper on a platform wherever the pour was located, and men with CMC concrete buggies wheeled the concrete to its location. Where the steel reinforcing mats were so thick that internal vibration was impossible, two Viber electric external vibrators were attached to the wood forms. Otherwise, five Mall vibrators were used internally.

Beyond the fourth floor, a Wagner Towermobile with a 105-foot tower was used. The Mixermobile mixed the material and discharged to the higher-lift machine when the latter was in use.

Some good performance records were turned in, despite the fact that most of the pours were relatively small. With the equipment listed, the concrete gang placed an average of 60 cubic yards per hour, and one peak day a 70-cubic-yard-per-hour run was turned in on a



C. & E. M. Photo
General Superintendent E. E. Kisse and Office Engineer S. A. Eberhardt take a look at a tough piece of wall detail on the Seattle-Tacoma Airport terminal building.

300-yard pour. On a fifth-floor pour, with the Towermobile hoisting 70 feet, the gang got 55 cubic yards an hour.

The use of Darex air-entraining agent in the concrete mix improved its workability and prevented excessive bleeding, according to the Resident Engineer on the project. Test cylinders were made on each pour, and they checked out with an average strength of 3,500 pounds at 28 days.

The concrete was proportioned on the basis of 517 pounds of cement, 1,324 pounds of sand, and 1,986 pounds of 1½-inch maximum-size rock. These dry weights yielded one cubic yard, and they were doubled to give the 2-yard batch which was used.

Batch-Plant Set-Up

Permanente bulk cement used on the project came in by transport truck and was unloaded to a hopper. There a screw conveyor and bucket elevator stored the material in a 250-barrel Blaw-Knox cement silo. Sand and rock aggregate, bought commercially at Auburn, Wash., was hauled 18 miles by truck. On heavy pouring days the trucks dumped directly to a feeder bin, where

a bucket elevator charged the two compartments of a Blaw-Knox batch plant. On light days the material was stockpiled and later fed to the feeder hopper by a Wagner Scoomobile. The dry batches were weighed out and sent to the job in two batch trucks.

On days when no pours were scheduled, the trucks were used to good advantage with a small Insley trench hoe, hauling backfill earth to the area around and over the garage. The dumped earth was then leveled off by a small Cletrac-mounted bulldozer blade.

Personnel

For the Port of Seattle Commission, George T. Treadwell is Chief Engineer on the job, with H. A. Moldenhour as Supervising Architect, Charles S. Dearstyne as Structural Engineer, and Lester G. Hall as Resident Engineer. Electrical engineering design was done by B. A. Travis, and mechanical engineering design was done by C. W. May.

E. E. Kisse was General Superintendent for Lease & Leigland, with Walter Layne as Assistant Superintendent, S. A. Eberhardt as Office Engineer, and Mike Thill as Field Engineer. Carpenter Foremen who grappled with a tough and interesting forming problem were Loren Payne, Roy Case, Rocko Fordham, and Dwight Payne. Ed Baker and W. S. Barnett were Labor Foremen, and concrete placing was done under the immediate supervision of Bill Vanooy.

Charley Farrar is Superintendent for I. G. Navarre & Son, and J. D. Dempsey was in charge of electrical work for the Agutter Electric Co.

Completion of the concrete work will speed the other work along, and it is estimated that by next May, when the contract time is up, Seattle and Tacoma will have an air terminal which will handle Northwest Airlines, Western Airlines, United Air Lines, Pan American World Airways, Trans-Canada Air Lines, and all the other aircraft needing terminal facilities in that area.

Complete with immigration and customs facilities, the new terminal will be colorful and cosmopolitan.

Adjustable Spreader For Sanding Projects

A truck-mounted sand spreader designed to distribute the material so that it falls in front of the truck's rear wheels is manufactured by the Anderson Engineering Co., 225 Bent St., Cambridge 41, Mass. The Anderson spreader is self-powered by its own gasoline engine. Its hopper has a struck capacity of 5.95 cubic yards, or 7.6 cubic yards when heap-loaded.

A feature of the Anderson Type H spreader is the screw designed to make the hopper conveyor self-unloading. It is located at the bottom of the hopper in such a way that most of the weight of the sand is carried on the sides of the hopper; thus compaction of the sand on the conveyor is practically eliminated, the manufacturer states. The screw conveyor discharges the sand to a rotating disk through an open non-clogging chute. An adjustable collector then deposits the sand at a predetermined part of the disk, permitting the spread of the greater part of the material in any direction desired. Width of spread is adjustable up to 40 feet, the manufacturer points out.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 59.

Detrex Calif. Office Moved

The Detrex Corp. has moved the location of its Los Angeles office to 625 S. Anderson St. This office and warehouse will provide quick delivery of Triad or Perm-A-Clor degreasing solvents, or Detrex alkali and emulsion cleaning compounds.

These are the facts about the job!

Location of Project — State highway 274, Henderson County — from Tool to Kaufman County line.

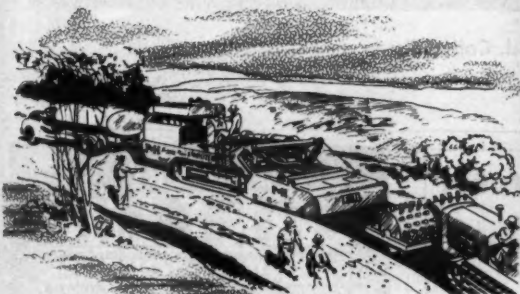
Length of Project — 7.68 miles.

Width of Roadway — 20 feet (2 lanes of 10 feet each).

Type of Soil — Loamy sand.

Stabilizing Agent — 4 gal. cracked fuel oil per sq. yd.

Rate of Production — Average 8,000 sq. yds. per working day.



The P&H Stabilizer Performs These 8 Basic Requirements in a Single Pass!

The report from Texas proves again its ability to fulfill these 8 basic requirements of soil stabilization with definitely predetermined results.

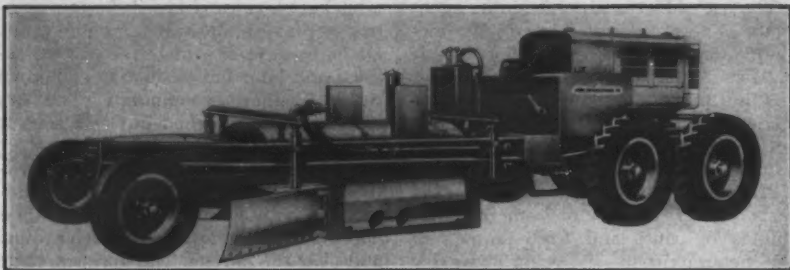
1. Control processing depth for accurate proportioning.
2. Pulverize the soil thoroughly.
3. Blend materials uniformly.
4. Create a true sub-grade.
5. Disperse the liquid through the entire volume in measured quantity.
6. Mix the coated material uniformly.
7. Lay the completely processed material in a fluffy, even depth, ready for compaction.
8. Do all these things in one pass — at a good rate of speed.

If you are engaged in the construction of secondary highways, streets, base courses, airport runways, etc., it will pay you to investigate the performance of the P&H Single Pass Soil Stabilizer under conditions similar to your own. Ask for the facts.

NEW SOUND MOTION PICTURES!

If you would like to see a P&H Stabilizer at work processing soil-stabilized roads — learn how it does it — write us about the showing of our new full color, sound motion pictures. One covers soil-cement and the other soil-bituminous work.





Here's the new self-propelled Model 42 Wood Roadmixer.

Large Self-Propelled Road-Mixing Machine

A large new road-mixing machine is announced by the Wood Mfg. Co., Box 620, 6900 Tujunga Ave., North Hollywood, Calif. The Model 42 self-propelled Roadmixer replaces the tractor-drawn Wood Model 48, which has been taken out of production. Roadmixers are designed to mix, in one pass, all types of aggregates or soil with any type of liquid binder or stabilizing material used in the construction of mixed-in-place surface pavements or base courses.

Features claimed for the Model 42 include: a 100-hp gasoline or diesel power unit, tandem drive, five working speeds ranging from 7.0 to 45.0 fpm, road speeds of from 1½ to 11 mph, one-man operation, large mixing drum, increased production, hydraulic controls, metered control of liquid binders, and others.

The company will continue to produce the self-propelled Model 36 and the tractor-drawn and tractor-powered Model 54. Many of the new design features of the Model 42, as well as a larger power unit, will be added to the Model 36, the manufacturer states.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 76.

Light-Duty Tractor

A light-duty crawler tractor is announced by the U. S. Tractor Corp., Warren, Ohio. It is powered by a 31.2-hp Continental gasoline engine and is said to have a 20.4 horsepower at the drawbar. It has four forward and four reverse speeds ranging from 0.92 to 6.75 mph. As a special feature of the Ustrac Model 10-A tractor, going into reverse requires no gear shifting; a flick of the reverse lever is enough.

The Ustrac has a 37-inch tread from outside of track to outside of track, a

92-inch length, a 43¼-inch width, and a 54-inch height from the grouser tip to the highest point. A bulldozer is available for the Ustrac as matched equipment. It has a blade width of 58½ inches, a blade height of 23½ inches, a lift of 15 inches, a drop below grade of 6¼ inches, and a weight of 500 pounds. Weight of the tractor itself is 3,425 pounds.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 103.

Structural-Timber Design

A text called "Simplified Design of Structural Timber" has been published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. This is the fifth in a series of books by Harry Parker, Professor of Architectural Construction at the University of Pennsylvania. Previous volumes have dealt with structural steel, reinforced concrete, roof trusses, and engineering for architects and builders.

The book assumes no previous training and a knowledge of only high-school arithmetic and algebra. It discusses the characteristics and classifications of wood; structural stresses, with emphasis on how wood members are affected by them; and design of timber members, including beams, joists and rafters, plank and laminated floors, and timber columns. The book also discusses timber connectors, truss design, and other matters of interest to the timber-design engineer. It contains tables, diagrams, and formulae on

working stresses, properties, and other engineering data. Cost of this 218-page book is \$3.25.

Portable Steel Buildings

A 32-page catalog on a line of portable steel buildings has been released by the International Derrick & Equipment Co., Division of Dresser Industries, 1315 Pacific Ave., Dallas, Texas. According to the manufacturer, these buildings can be easily assembled and erected from standardized mass-produced special deep-ribbed parts.

Catalog B-48 illustrates the three main structural types—self-supporting, rigid-frame, and mill-type—and describes them in detail. Complete specifications and construction features are also listed. The Ideco steel buildings are designed for use as field offices, temporary warehouses, machine shops, and similar field applications.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 107.



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was used on this
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Heaviest Pull-Type now on the market. 15" blade clearance. More range into the ditch. Excellent for finishing and maintaining until job is accepted.

Will dig or clean ditches, cut sod and rebuild a mile of town road per day, ready for the gravel. Can be supplied with front control for one-man operation. No sore customers with the "HUSKY."

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EMBURY MFG. CO., WARSAW, N. Y.

Asphaltic Road Job, Grading and Paving

Grading, Granular Base, And Asphaltic-Concrete Pavement Are Pushed by Fast-Moving Contractor

(Photo on page 1)

† A NEW piece of asphaltic-concrete highway 8.7 miles long, centered on U. S. 10 near Valley City, N. Dak., was finished during the working season of 1948. The \$550,000 job got under way June 25. And the W. H. Noel Co. of Jamestown, N. Dak., expected to have it finished by November and the first snowfall.

The new highway, financed in part by Federal Aid, is included in some comprehensive betterment work along transcontinental east-west U. S. 10. The contract called for about 600,000 cubic yards of grading, production and placement of a granular flexible base course, production and placement of a new 2½-inch asphaltic-concrete surface 22 feet wide, and minor items.

Under a second structural contract connected with this job, the Lindberg Construction Co. of Jamestown built curbs and gutters where the highway passes through Valley City. Several concrete-box culverts were also built under this second contract. They included an extension to an existing 8 x 6-foot structure, the construction of a double 6 x 6 x 81-foot culvert, a 7 x 7 x 110-foot structure, and an 8 x 6 x 40-foot culvert under the Northern Pacific railroad. Lindberg built 300 feet of galvanized-metal bin-type retaining wall where the new highway passes close to the Sheyenne River.

New Highway Cross Section

The new job replaces an obsolete section of road-mixed bituminous highway, and eliminates two crossings of the Northern Pacific railroad and a number of bad curves. Part of the old road will be retained, however, and used in the state highway system.

In cross section, the graded-earth roadbed on the new highway is 46 feet wide, with gentle 4 to 1 backslopes and end slopes. This design will largely eliminate the accumulation of drifted snow in winter, with the help of cross winds which sweep the Dakota prairies in the snow season.

A 5-inch-thick blanket of 2½-inch-minus pit-run base course rests on the graded-earth base. In some places where the bearing value of the soil was low, this material was thickened to 12 inches, but the average specified thickness was 5 inches. This blanket, 44 feet wide, was put down on a thin 2½-inch layer of temporary traffic surface, which was laid on the finished embankments. This temporary base, or traffic surface,

was made with 1-inch-minus rock from a borrow pit.

Atop the pit-run material is a 2-inch layer of stabilized material, made up of 1-inch-minus rock and about 20 per cent of fine sandy material, road-mixed, waterbound, and rolled with pneumatic-tire machines. This layer of material is 42 feet wide. Its surface was primed with 0.25 gallon per square yard of MC-1 asphalt prior to the placement of hot-mixed asphaltic concrete.

On top of this material is a 2½-inch layer of compacted asphaltic concrete, laid 22 feet wide. The surface of this pavement was sealed with RC-2 asphalt and covered with a sand blotter to complete the job.

The only exception to this cross section is located through Valley City,



C. & E. M. Photo

This shop-built screening machine produced pit-run material for the W. H. Noel job.

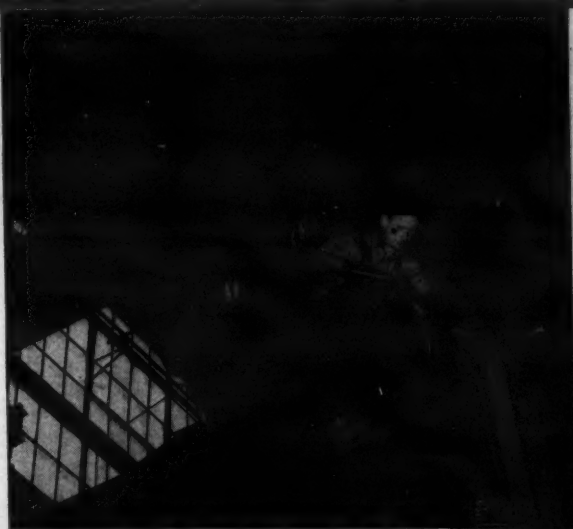
where the pavement is 40 feet wide from curb to curb. One of the unusual headaches for the engineers of the State Highway Department was the fact that the job was divided into four Federal-Aid numbers, which meant the preparation of eight estimates per month.

Grading Operations

The W. H. Noel Co. organization includes several skilled part-owner superintendents, each of whom controls his own "spread" of heavy equipment. Two such outfits worked the Valley City job. Lyman Leahy worked the

(Continued on next page)

Improved Performance with LAY-SET PREFORMED



Rotary oil well drilling requires a wire rope of the absolute best construction and grade. For years Hazard has furnished LAY-SET Preformed in 6 x 19 Seale construction, made of improved plow steel wires and with an independent wire rope center, for rotary drilling. The bigger outer wires wear longer, the center adds strength, and the preforming means better spooling on the drum.

For heavy or light loads on overhead traveling cranes Hazard LAY-SET Preformed wire rope improves performance. Why? Because it operates smoothly over sheaves and drums... it spools evenly. It's relaxed, easy to handle. LAY-SET Preformed means longer life and lower cost.



Get up close to a shovel. Watch the bucket quiver and jerk as it is filled. Watch the lines rubbing against each other. Watch them bend by the hour around small sheaves. You'll see the reasons why LAY-SET Preformed 6 x 19 filler wire Lang-lay improved plow steel with independent wire rope center is needed for improved performance.

In the oil and logging fields, in marine, elevator, industrial, contracting, mining service there are correct constructions of Hazard LAY-SET Preformed for every wire rope use.

Specify LAY-SET Preformed next time.

WON'T QUIT or cause time out



A Hayward Bucket keeps the job going ahead on scheduled time. It won't quit or cause time out.

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Asphaltic Road Job, Grading and Paving

(Continued from preceding page)

east end with his machines, and Art Orton had his similar equipment fleet on the west end. Both men had their share of headaches. On the west end, Orton had to build a 55-foot fill high over an 84-inch concrete-pipe culvert. Lyman Leahy had to build grade up a long, sliding hill east of Valley City. The hill was full of hidden springs, and had slip-planes of clay intermingled with the sand and gravel.

At the peak of the work, both men used equipment fleets quite similar as to make and model. Leahy, for example, used 8 LeTourneau 15-yard Carryalls pulled by D8 Caterpillar tractors. Three Caterpillar DW10's were used on the long hauls. Leahy had 3 D8-mounted bulldozers, 5 D4's with small sheepsfoot rollers, a D6 with a large double-drum LaPlant-Choate sheepsfoot roller, 4 Caterpillar No. 12 motor graders, and 4 water-tank trucks of 1,200-gallon capacity each. Water from a creek about halfway through the job was pumped to the water trucks for both equipment spreads.

The soil to be excavated was generally a sandy clay, with occasional planes of clay and clay-gumbo. It was all common excavation, and no rock drilling or blasting was necessary. The machines were assigned to work the balance points with the shortest possible haul, and with the exception of the DW10 location, one-way hauls averaged 700 feet. On this length of haul, Leahy could estimate the output of his Carryalls at 100 cubic yards of earth per machine per hour and be quite accurate.

Traffic had to be carried through the job at all times, and of course the peak traffic counts coincided with the period of greatest activity on the fills. One hectic day when Leahy was trying to finish a section of fill the cars came so thick and fast for that part of the country that he pulled out his watch to check the count. He found that 47 vehicles darted around his Carryalls and rollers in the next 5 minutes.

To solve the problem of traffic, the fill sections on the east end were made as short as possible. One-half the fill was brought up while the traffic used the old road. Then while the cars used the completed fill, the earth-moving equipment brought up the other half of the earth work.

The dirt was laid down in lifts not greater than 6 inches thick, because density requirements called for 95 per cent minimum modified compaction. Water was then added, if needed, and bulldozers or motor graders leveled off the dirt ahead of the sheepsfoot rollers. Ordinarily about seven roller passes produced the required density.

On the west end, about half the total length of the new job lay on new location. No traffic passed through this section to plague Orton's men, and better progress could be made. Too, the 84-inch concrete-pipe culvert arrived on schedule and was placed on location. Stone masonry headwalls, fastened together with cement mortar, were placed after this high fill had been made.

The minor quantities of compacted earth in farm turnouts, county road connections, and the like, were kept as far up as possible, and only a week or so was required to finish and dress the west end after the main fill had been completed. The finished earth work on both ends of the job is as streamlined and modern as can be seen anywhere in North Dakota.

On the east end of the job, where the new road crawls up grade through a heavy hillside cut, Superintendent Leahy ran into trouble. Unknown to anyone save the geologists, the hillside was loaded with springs and seep



C. & E. M. Photo

A double-drum sheepsfoot roller compacts earth laid down by the LeTourneau Carryall in the background—on the W. H. Noel \$550,000 grading and paving job near Valley City.

water. Specifications called for approximately 15,000 cubic yards to be wasted there. Progress grew slower when the

machines went down through this cut, but it did not stop. When the cut was about two-thirds finished, however,

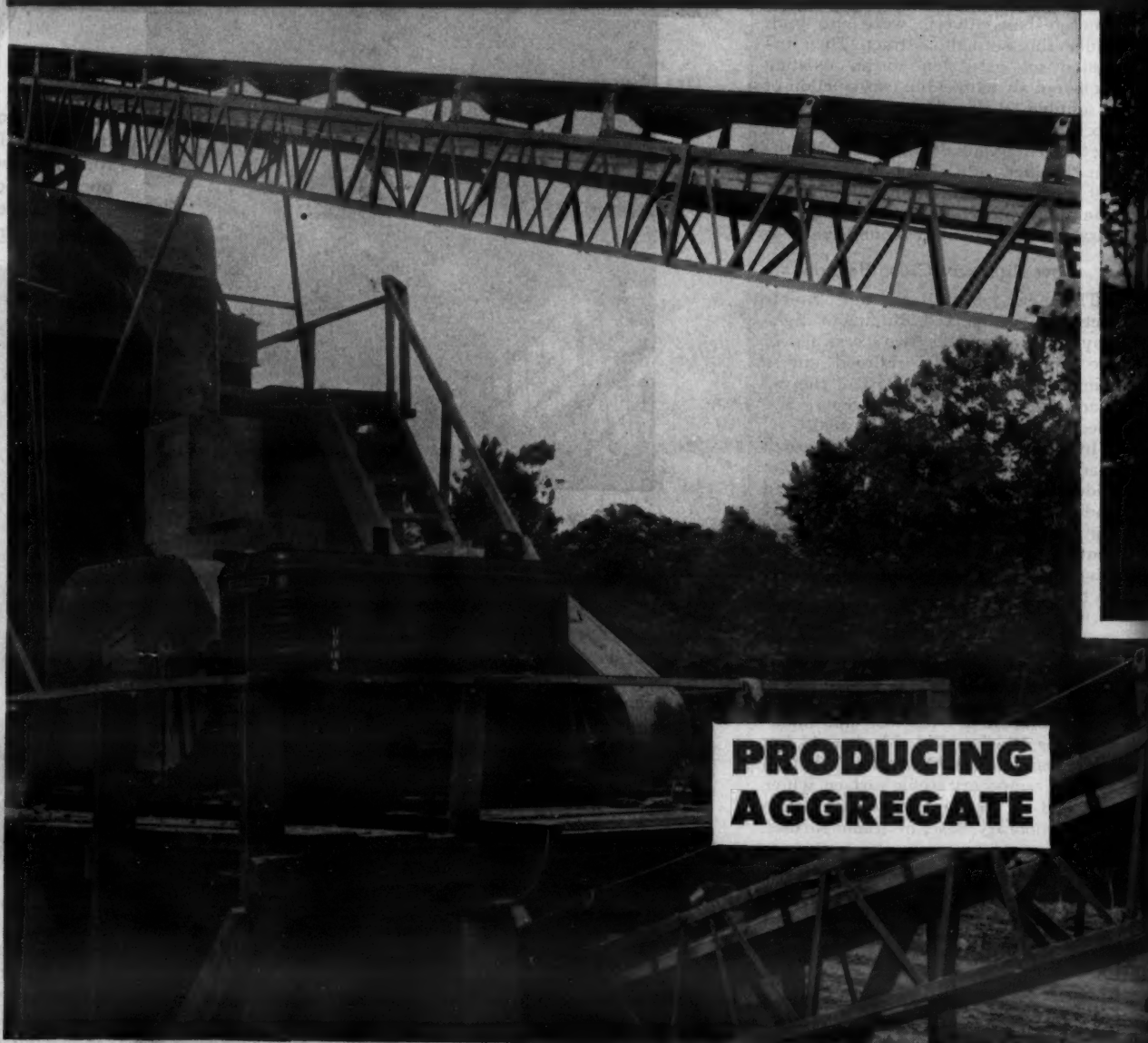
considerable slippage occurred, and studies were under way when the job was visited to determine whether cut slopes should be changed or whether other preventive action might be necessary.

With the heavy equipment working on a 20-hour-per-day basis, careful maintenance and repair service was necessary. The W. H. Noel operations are largely "trailerized", with repair parts and facilities mobile from job to job. Each equipment spread had its own facilities of this kind; moreover, quite a number of the key men and their families lived in trailers in temporary camps at each end of the job.

A mobile grease and fuel unit made its rounds once a shift, and a master

(Continued on next page)

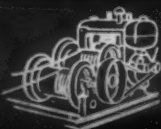
POWER!



**PRODUCING
AGGREGATE**

CRAWLER TRACTORS
POWER UNITS
DIESEL ENGINES
WHEEL TRACTORS

INTERNATIONAL



mechanic was available at each camp to make repairs on the spot. Machines occasionally broke down for a few hours, but the prompt replacement of parts kept valuable down time to a minimum.

Granular-Base Work

An excellent native deposit of granular glacial material is located about ½ mile north of Valley City. For many years state highway maintenance engineers have produced bituminous premixes there, and the deposit, for practical road-building purposes, is almost without limit. The pit contains coarse material, fine sand, and even pockets of silty sand.

This pit was naturally designated as the source of supply for the production



C. & E. M. Photo

Here is a part of the trailer city which made up W. H. Noel Co. job headquarters.

of the granular base course, as well as for the aggregate mineral filler in the asphaltic-concrete mix. Approximately 70,000 tons of material were removed

from the pit for this project.

Specifications for pit-run material called for a well graded mix with maximum particle size of 2½ inches. With the exception of occasional oversize material, one part of the pit proved ideal for this purpose.

Rock production and processing was done by W. H. Noel Co. equipment and crews under the direction of General Superintendent Ray Everts, with Morris Olstad as his Field Superintendent. Everts often has two or three projects under way simultaneously.

Pit-run material was shoved by a Caterpillar D8 bulldozer to an 8 x 10 feeder trap, which passed it down to a 24-inch x 30-foot conveyor line. This conveyor carried the material up to a shop-built screening machine designed to perform just this kind of work. It was basically nothing more than a 4 x 10-foot vibrating screen deck, with interchangeable mesh sizes; a small hopper; a conveyor discharge for passing material; and a conveyor discharge for the few oversize boulders retained on the screen. It was powered by a Caterpillar D8800 diesel engine.

For this job, the 4 x 10-foot screen deck was covered with a 2½-inch-mesh Diamond screen. The rock from the conveyor dropped on this screen, oversize material passed off to one side through a conveyor, and the passing material dropped down to the bin where it traveled by conveyor to waiting trucks.

A fleet of up to 22 rented trucks was used to haul the pit-run material out to the job. There it was dumped according to volumetric content per station, road-mixed with water by the three Caterpillar motor graders in Everts' equipment spread, and laid down from a windrow. As the thin lifts went in, they were compacted by sheepsfoot and pneumatic-tire rollers. Four pneumatic-tire rollers, pulled by International rubber-tired tractors, were used on rock work.

The stabilized-base-course material and the asphaltic-concrete aggregates were produced in another part of the pit by a Cedarapids Pitmaster crushing and screening plant. This machine turned out material at the rate of 190 tons an hour, and it required two Caterpillar-D8-mounted bulldozers to keep the pit material up to the feeder.

As the bulldozed material dropped through the feeder trap, it passed over a 24-inch x 35-foot conveyor to the first Cedarapids unit. This unit had a 4 x 12-foot scalping vibrating deck covered with 1½-inch-mesh screen, and a 10 x 36 primary jaw crusher. Oversize material from the screen dropped through this crusher and rejoined the passing material, which took it on to the second unit. The first primary unit was powered by an International UD-14 diesel engine.

The second Cedarapids unit was composed of a double-deck 4 x 12 screen, with sizes which were interchangeable to produce the few sizes required. It also had a 40 x 24 roll crusher. This unit was powered by a Caterpillar D13000 diesel engine, and a small generator driven by four V-belts from a front pulley produced electric light power for night operation if required. Ordinarily the crusher worked only one 10-hour shift, however.

The material was somewhat troublesome on the screens, especially when fines were plentiful and the deposit was wet. When this condition occurred, the fine dirt particles tended to bridge across the screens, causing a loss of effective screen area. The only remedy was to shut down for a few minutes and clean the material away. Some of the trouble was eliminated by exposing the material to the wind and sun as much as possible with bulldozers.

Crushed material passed directly from the secondary unit to a conveyor, which discharged it to a fleet of waiting

(Concluded on next page)

MOVING EARTH

INTERNATIONAL ENGINES — powering tractors or power units—deliver rugged, low-cost power that cuts operating costs to rock bottom.

Producing aggregate the International UD-18A is one of three International Power Units driving a rock crusher. The low operating cost of these power units is an important factor in profitably meeting the competitive price of crushed stone.

Moving earth to clear the way for a hospital

addition is the task of the International TD-18 Diesel Crawler and matched scraper. Averaging 120 yards per hour, the TD-18 did a fast, profitable job of moving a total of 10,000 yards.

You just can't beat International Power for peak production and low operating and maintenance costs. Visit your International Industrial Power Distributor and let him show you how International Tractors and Power Units will produce more profits on your projects.

INTERNATIONAL HARVESTER COMPANY • CHICAGO

Listen to James Melton on "Harvest of Stars" every Wednesday evening—CBS



Industrial Power



Asphaltic Road Job, Grading and Paving

(Continued from preceding page)

trucks. A great deal of the stabilized-mix material was hauled out to the job, while 9,000 tons of mineral aggregate for the hot-mix was produced and stockpiled for later use when the asphalt plant arrived.

On the stabilized base course, a motor grader road-mixed the fine material in with the fine rock before water was added. After the water was added, further mixing was done by motor grader before the material was then cut out of the windrow and laid down in thin lifts.

Rubber-tire rolling was handled simultaneously with top dressing, by motor graders working to survey blue-tops. The job was done so exactly to grade that speeds up to 60 miles an hour were as smooth as if the paving had already been placed.

Asphaltic Concrete

A Littleford asphalt distributor was priming some of the job when it was visited, and the hot-mix asphalt plant was due to arrive in a few days. The unit used was a Madsen batch plant, with appurtenant steam-boiler equipment, asphalt tanks, and pumps. It was set up near the Cedarapids crusher to the northeast about 500 feet.

Asphaltic cement of 120-150 penetration was used in the mix at a rate of 5 per cent by weight. The asphalt came to Valley City from the Wyoming oil fields, and was spotted on the Northern Pacific Railroad sidings there. Transfer trucks hauled the material to the plant after a tank-car heater brought it back up to pumping temperature.

The asphaltic concrete was laid down by a Barber-Greene Tamping-Leveling Finisher in two 11-foot strips. It was rolled by tandem 12-ton rollers to get the required density.

Personnel

The job was designed and supervised under the general direction of M. P. Wynkoop, Chief Engineer of the North Dakota State Highway Department, with F. H. Brasie as Construction Engineer, D. E. Smith as Division Engineer, and R. E. Bradley as Road Design Engineer.

In addition to Lyman Leahy, Ray Everts, Art Orton, and Morris Olstad of the Noel organization, Walt Olsen

was Project Engineer and Jack Klontz was head Master Mechanic.

Barrow or Truck Unit Self-Propelled

A wheel-mounted power unit designed for use with a wheelbarrow or light-duty flat-truck body is manufactured by C. G. Schulze Co., Inc., 2530 N. Naomi St., Burbank, Calif. According to the manufacturer, the Pow-r-Wheel will climb grades up to 30 per cent with loads up to 1,000 pounds. The barrow body and flat truck are quickly interchangeable. Finger-tip throttle control is provided at the handles used to guide the unit. The Pow-r-Wheel is powered by a 2½-hp single-cylinder gasoline engine; it has two 12-inch-diameter pneumatic tired drive wheels. Clutch control is at the operator's left hand, and automatically disengages when the operator lets go of the machine.

The Model 124 barrow has a capacity of 10 cubic feet or 1,000 pounds. The flat truck has a bed area of 1,080 square inches and a capacity of 1,000 pounds. Both units are 63 inches long, 37½ inches wide, and 37 inches high.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 49.

Wire-Rope Care, Handling Covered in New Catalog

A 188-page stiff-bound catalog has been released to celebrate the 50th year of wire-rope making by the Wickwire Spencer Steel Division of The Colorado Fuel & Iron Corp., 500 Fifth Ave., New York 18, N. Y. The catalog is divided into three sections covering (1) the characteristics of wire rope; (2) the use of specific types of wire rope in various industries; and (3) the care and handling of wire rope.

The first section on the characteristics and construction of wire rope deals with types of lay, number of strands, types of cores, diameters and tolerances, etc. It includes a series of tables on safe working loads, breaking strengths, and so forth. The second section shows winding diagrams for wire rope in power shovels, draglines, cranes, derricks, and other applications.

The third section of the catalog deals with the care, handling, and splicing of wire rope. It illustrates and describes



Shown here with a barrow body, the Pow-r-Wheel is also available with a flat-truck body. It is powered by a gasoline engine and is designed to climb grades up to 30 per cent with a load up to 1,000 pounds.

the proper method of uncoiling and unreeling, cutting and seizing, attachment of sockets, endless splices, splicing an eye into wire rope, attachment of clips,

etc. The catalog contains a complete listing of the Wickwire types and sizes of wire rope and slings and fittings. It also contains a listing of trigonometric functions to five places, and other tables and formulae applicable to the use and handling of wire rope and wire-rope fittings.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 98.

Changes for Kennametal

A new building to house its carbide division has been erected by Kennametal, Inc., of Latrobe, Pa., at a cost of \$200,000. This is the second extension of plant facilities in a year, and will provide 6,000 square feet of floor space.

Kennametal also announces the appointment of John A. Storrs as a Sales Representative in the New York district. Mr. Storrs will work out of the company's offices at 6 W. Broadway in New York City.



The new Cyclone #1000 blast hole drill is designed especially for contractors needing a heavy duty, self-propelled drill for blast holes. This drill moves easily under its own power to any location and sets up quickly. It is equipped with a power derrick hoist and the drilling tools can be carried directly on the drill while it's moving.

Cyclone Model 1000 drills holes from 3¼" to 7" in diameter. It is extremely efficient since it is equipped with the Air Spudder shock absorbing device which not only takes away the terrific shock and strain received on the drilling mechanism itself but adds a snap to the tools which will give greater drilling speed. A 35 HP gasoline engine supplies power for the heavy duty transmission giving three speeds forward and one reverse.

You can eliminate long hauls and extensive freight charges by producing ballast near the job. The Sanderson Cyclone #1000 will drill more blast holes faster and more economically—and move under its own power. Write for complete specifications on the new blast hole drill.

SANDERSON CYCLONE DRILL CO.
ORRVILLE OHIO

New LIGHTWEIGHT ELECTRIC PLANT

5000
WATTS D.C.

Weights only 315 lbs.!

Model SK-115M, 5,000 watts, 115 volts D.C.

Use fast-working electrical tools on any construction or maintenance job with this high capacity, portable, compact electric plant. Equipped with four-receptacle box for direct plug-in of tools or lights. Available with carrying frame, or dolly-mounted. Powered by Onan 10 HP, two-cylinder, 4-cycle, air-cooled engine. Shipped complete... ready to go!



Write for catalog

NEW ONAN "CK" ELECTRIC PLANTS are available in 5000 watts D.C., 115 and 230 volts; 2000 and 3000 watts A.C. in all standard voltages. COMPLETE ELECTRIC PLANT LINE INCLUDES: A.C.—350 to 35,000 watts in all standard voltages and frequencies. D.C.—400 to 15,000 watts, 115 and 230 volts. Battery Chargers—500 to 4,000 watts, 6, 12, 24, 32 and 115 volts. ONAN AIR-COOLED ENGINES—CK: 2-cylinder opposed, 10 HP. BK: 2-cylinder opposed, 5½ HP. 18: 1-cylinder, 3¼ HP.

D. W. ONAN & SONS INC.
4854 Royalston Ave., Minneapolis 5, Minn.

ONAN ELECTRIC PLANTS

Equipment for Jeeps

Seven implements designed to increase the usefulness of the Jeep have been announced by The Newgren Co., Butler, Pa. These include a snow plow, terracing blade, scoop, earth-mower, high-speed mower, post-hole digger, and a hydro-grader and terracer. The Newgren tools are engineered especially for use with the hydraulic lift manufactured by the Monroe Auto Equipment Co., Monroe, Mich. But they can be used with any type of hydraulic equipment, Newgren explains.

The Sno-Dozer comes in either a 5 or 6-foot blade. It has a reversible cutting edge and is 24 inches in depth. In addition to its use as a snow plow, it can also serve for terracing, backfilling, and other earth-moving projects. The Newgren terracing blade features simple adjustments for control of angle and pitch, and depth and tilt. It has a turning radius of 360 degrees. The lift-type scoop has a capacity of 6 cubic feet and can be used for loading, scooping, carrying, and leveling. It has a cutting width of 24 inches.

The Newgren earth-mover has a capacity of 1 cubic yard and will travel at speeds up to 25 mph. It is recommended by the company for grading, land leveling, excavating, and other road and construction uses. The sickle-type mower is available with either a 6 or 7-foot cutter bar. It features an automatic safety breakaway device which is designed to release the cutter bar if it strikes a hidden obstruction. The post-hole digger is run by the Jeep power take-off and is available with several sizes of auger bits. If the digger becomes stuck, the auger can be reversed to unscrew itself from the obstruction. The Newgren hydro-grader and terracer is especially recommended by the company for grading dirt roads, landscaping road shoulders, leveling and sloping, ditch filling, general maintenance, and other uses.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 104.

Hamilton-Thomas Formed

Formation of the Hamilton-Thomas Corp. as an operating organization is announced by officials of the company. It will supervise the operation of Economy Pumps, Inc., Klipfel Mfg. Co., and Liberty Planers, Inc.

THE NEW LOOK for the MIGHTY MIDGET



BREAK WITH POWER, SPEED, ECONOMY

The MIGHTY MIDGET reduces the cost of breaking asphalt and concrete to a minimum cost that is unequalled by other methods. Tamps backfill at an unbelievable pace; gives high density. All controls within operator's reach. Operates on 105 C.F.M. compressor.

Ask your dealer or write for complete information.

R.P.B. CORPORATION
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Five of Newgren's implements for use with Jeeps are shown above. Attached to the Jeep is the all-purpose earth-mover. The 6-cubic-foot scoop and the post-hole digger are in the foreground, the lift-type terracing blade in the center, and the hydro-grader and terracer at the upper left.

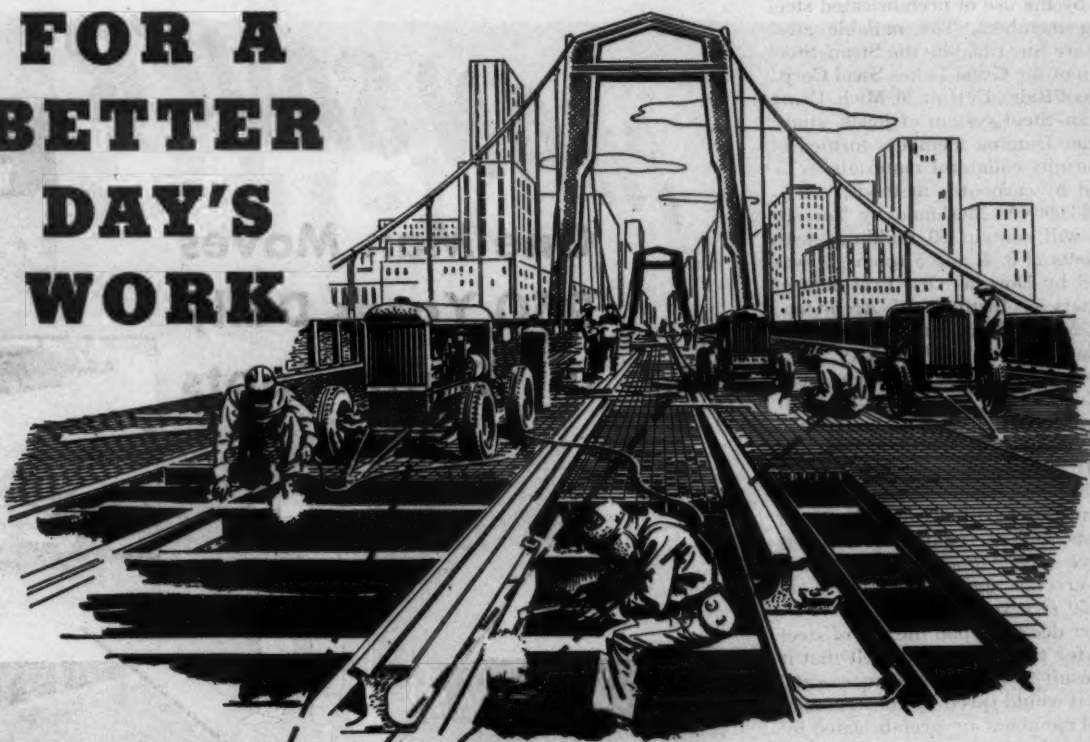
How Rubber Tires Are Made

The story of rubber tires and how they are produced—from raw rubber to finished product—is told in a descriptive booklet released by The Goodyear Tire & Rubber Co., Akron 16, Ohio. This booklet (12th edition) discusses the growing and tapping of the rubber tree, factory operations in building tires, rubber research and development, and other phases of rubber-tire production.

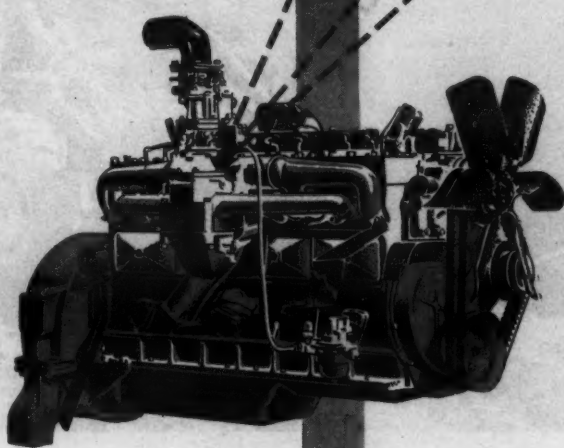
Photographs show Goodyear facilities in 1920 as compared with 1948. They show refining of the latex, production of tire fabric, and tire making step by step. The making of both the rubber carcass and the rubber inner tube is described. The booklet also illustrates several applications of rubber tires, following their development from the light-duty products of the 1920's to the heavy-duty construction-equipment tires of today.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 55.

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ON THE HIGHWAYS—IN INDUSTRY—ON FARMS—IN OIL FIELDS—AND IN FORESTS!



● Where metal is arc-welded to metal . . . in bridges, pipelines and other construction projects . . . Chrysler Industrial Power Units provide the most efficient, most economical power. Backed by 24 productive years of Chrysler Corporation engineering and technical skill, each engine and power unit is designed to deliver A Better Day's Work—is built to do the tough jobs in every field where gasoline engines are used. For complete information on the many engine sizes in the line and the wide range of horsepower ratings available, see your local Chrysler Industrial Engine dealer, or write . . .

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HORSEPOWER WITH A PEDIGREE



Nailable steel framing members, furnished by the Stran-Steel Division and prefabricated by welding, are speeding erection of 59 two-story apartment buildings in New Haven, Conn.

Steel-Frame Houses Up at One-a-Day Rate

Two-story apartment houses are being mass-produced in New Haven, Conn., by the use of prefabricated steel framing members. The nailable steel frames are furnished by the Stran-Steel Division of the Great Lakes Steel Corp., Penobscot Bldg., Detroit 26, Mich. Using the Stran-Steel system of joists, studs, and other framing members formed of steel permits collateral materials to be attached by carpentry methods.

The \$3,000,000 McConaughy Terrace project will contain 59 buildings with apartments of 3, 4, and 5 rooms. It was designed by Douglas Orr, President of the American Institute of Architects, with B. M. Pettit as consultant for the New Haven Housing Authority. It is being constructed by the Fusco-Amatruda Co., of New Haven. Contract for the Stran-Steel framing and its erection is held by the Builders Steel Framing Co., of Bridgeport, Conn.

Each building frame includes exterior walls, interior partitions and floor and roof joists, and corrugated-steel sheets to receive second-floor concrete slabs. A steel-erection goal of 59 days is set for the 59 structures.

Mr. Orr decided upon the use of steel framing for two reasons: he felt that it would result in low maintenance costs, and that it would speed up construction. The steel members are prefabricated by welding at the Bridgeport shop of the Builders Steel Framing Co. The members are loaded on trucks and delivered to the job site ready for erection. A Bucyrus-Erie Hydro-Crane lifts them into position, where they are braced and nailed by carpenters. Steel screws are used to provide the final connection between frame members. This method has made it possible to put up the buildings using only carpenters and laborers on the actual job site.

Exteriors of the building will be stucco and brick veneer. All-steel sash will be used with steel trim around the doors. Wood doors will be used inside and out.

Portable Conveyors

A complete line of portable conveyors is manufactured by J. C. Corrigan Co., Inc., 41 Norwood St., Boston 22, Mass. It includes belt conveyors, scraper conveyors, bucket loaders, car unloaders, and others. These are manufactured under a license agreement with the Jeffrey Mfg. Co. of Columbus, Ohio, which supplies the parts and designs for their construction.

Items in the line include a 14-inch troughed-belt conveyor; a 24-inch troughed-belt conveyor; a 12-inch flat-belt conveyor; a 16-inch flat-belt conveyor; a portable scraper conveyor with gravity chute; a portable scraper conveyor with retarding screen; a portable scraper conveyor in 25, 30, and 35-foot lengths; a Junior bucket loader; a portable belt car unloader; a 14-inch carry-

all belt conveyor; an apron stacker; and baggers and loaders.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 19.

Data on Concrete Cutter

Features of the Stratedge concrete cutter are explained in a bulletin distributed by the Backlin Products Co., 461 Washington St., Burlington, Wis. This pocket-size folder contains a complete description of the Backlin cutter, as well as a list of its specifications.

The bulletin gives data on the diamond wheel cutters used with the Stratedge machine, including blade sizes available and their speed of operation. Power-unit rating, type of drive, water supply, and tires are among the specifications presented. The folder also shows views of the Stratedge in use.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 111.

Black-top mixing plant



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DELIVERY
from Stock**

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STANDARD is one of the oldest and largest builders of paving plants—seven sizes to meet all conditions. Used throughout the world. Modern, Unit-built, easy to erect and transport.

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MAN SAVER

One Man Moves
250 Yards Daily
in Tight Spots



● Making a driveway for entrance to this new factory called for a cut eight feet deep and moving 1000 yards of earth. It was no place to use ponderous equipment. With this Case "DI" tractor, powering both a Lull Shovel loader and a LaPlante-Choate "C-22" scraper, it was a one-man job, completed within a four-day limit.

Whether your "tight spots" mean cramped room, labor cost or scarcity, limitations of time or of justifiable investment, look into the savings you may make with a Case Industrial Tractor. Built in four basic sizes, with a choice of mounted equipment for each size, Case tractors offer you a tailor-made fit for your own individual needs. Their extra strength and stability make them ideal power-plants for mounted loaders, winches, snow plows, etc. Their extra ENDURANCE is your best assurance of high dependability and low maintenance.

See your Case Industrial Dealer

He is strategically located to serve you conveniently, staffed and equipped to serve you well. Besides Case tractors and engine units he offers a well chosen line of related equipment such as tractor-mounted loaders, mowers, snow plows, sweepers, bulldozers and scrapers. Specializing in the power and equipment problems that prevail in your area, he has broad experience that can be helpful to you. J. I. Case Co., Racine, Wis.

CASE 

County Road Crews Whip Logging Damage

Heavy Truck Loads Are Hard on Highways, but Fast New Construction Helps to Solve Problem

† MANY a county road system is just like the weather, there is more talk about it than action. But in southwestern Oregon, high up in the logging country, there is a county which believes in doing something about its roads. Douglas County, with headquarters in the county seat at Roseburg, is near the top of the list of heads-up road organizations in the state of Oregon—indeed, in the Pacific northwest.

Evolution of the Problem

To understand its road problem today, and how it originated, it helps to know something of Douglas County's background. In the early days the county was a famous Oregon agricultural center, and even today it raises more sheep than any other Oregon county. But in the 1920's, large lumbering interests began to exploit vast timber stands in the big 5,000-square-mile county.

For a few years the lumbering industry flourished. Then came the depression. Lumbering went into a nose dive. Agriculture dropped off. Land owners could no longer raise money to pay their taxes, and the county foreclosed on a vast acreage within its limits.

In the meantime, about 900 miles of roads had been built—but not to high standards, mind you, and that is the crux of today's problem. The roads were built to the horse-and-buggy standards of another day. Today some of these roads are a little too wide for one car, and a little too narrow for two.

With the war and victory, prosperity hit Douglas County like an avalanche. Its timber was sorely needed by a hard-pressed nation. Over 300 sawmills went into action in the county, and the price of log stumpage rose from 50 cents a thousand to as high as \$20. The price of fine fir "peelers" hit \$90 in the sawmill ponds—\$90 per thousand board-feet, and some of the big logs contain several thousand such board-feet.

Naturally, a mighty fleet of logging trucks rumbled into action. Load limits rose. Soon it was legal to haul 72,000 pounds in one truck and semi-trailer load. And the old county roads, built to the standards of another day, began to cave in.

At the head of Douglas County, insofar as her highway destiny lies, is a group of men who immediately recognized the problem. What is more important, they were willing to grapple with it. And they knew that the answer lay not in maintenance alone. Part of the answer was new construction to much higher standards, using the most modern mechanized equipment money could buy to lower overall costs.

Meet the Organization

Heading the county road organization is Judge D. N. Busenbark—affable,

poised, immensely practical. The Board of Commissioners includes 71-year-old H. B. Roadman, loyal Douglas County Oregonian, and L. V. Beckley, junior member of the team. Beckley is young, friendly, competent, and businesslike. Two of his uncles were commissioners before him, and helped to build the fine marble courthouse in Roseburg in 1928.

The men out where the dirt is flying are County Roadmaster and Engineer F. C. Frear, and County Road Supervisor D. Owens. Mr. Frear has been Roadmaster of Douglas County for 30 years, in which time he has seen remarkable changes take place. Owens, with 11 years, has also seen his share of tire pressure and public pressure.

Each day these men hold some kind of informal meeting, but once each



C. & E. M. Photo

Douglas County Road Foreman J. G. Russell glares at a passing log truck, heavily loaded, as Road Supervisor Owens tries to discuss some business.

year, at least, a meeting is held which treats the whole road system and plans improvements for the coming year. Plans now include from 25 to 40 miles of new bituminous construction per year, replacement of 40 bridges, and the

construction of 50 to 60 miles of heavy 24-foot x 18-inch base-course work on the gravel road system.

It takes money, of course. And imagination. These men have both.

(Continued on next page)

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Eaton 2-Speed Axles not only add to motor truck utility and performance, but they actually effect important savings in operating and maintenance costs and add materially to vehicle life. Because Eaton 2-Speed Axles provide the right gear ratio for every road and load condition, engines may be run in their most efficient and economical speed range. Stress and wear on major vehicle parts are held to a minimum. On most trucks of 1½ tons and larger, Eaton 2-Speed Axles will actually more than pay for themselves. See your truck dealer for complete information.

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Some exclusive territories now open for dealerships.



Use "Messenger" Service

County Road Crews Whip Logging Damage

(Continued from preceding page)

To start with, increased industry in the county brought in a new population, and revenues from automobile and gasoline taxes rose. Certain old timber revenues from the Oregon and California land grants, dating back several decades, began to come in lieu of taxes. The road share of property taxation helped. U. S. Forest Service timber reserves contributed something.

And last but not least is Douglas County as a big business enterprise. Remember those lands which wouldn't produce taxes during the depression? Lands the County foreclosed? Well, the County is now selling timbered lands to lumbermen to harvest the timber over a long period of 5, 10, even 20 years. And the handsome revenues are doing their share of road building, as well as helping to build schools and run the general county business including the county hospital. Farsighted men are thus making the timber help to pay for the things a modern society needs, and they are doing it in such a way that the timberlands will be helped rather than impaired.

How can you sell a man timber rights, and then control the weight of log loads he hauls over the highways? It's an interesting problem. More and more road builders and maintenance men are slowly coming to realize the economic issue it poses. But read on.

Revenues from all these sources—including fines as high as \$280 per individual load—give the county a current operating fund of about \$1,020,000 per year for road building—and by "road building" is meant precisely that. Maintenance is important, but secondary to the bigger job of reconstruction, as a breakdown of the Douglas County organization clearly shows. It includes a bridge superintendent with 2 crews, a shop foreman in charge of equipment repairs, 10 district road patrolmen, 9 motor-grader patrolmen, a weighmaster with a 3-man crew, 3 shovel operators, a crushing-plant superintendent and his crew, 2 bulldozer and scraper operators, powderman, an asphalt foreman, another asphalt boss on maintenance work, and miscellaneous workers who swell the steady payroll to about 120 men.

Operations center in Roseburg at the courthouse, and in the same city at the equipment yard.

Lesson in Road Economics

Douglas County backs up its reconstruction program with some sound and interesting reasoning. For example, when County Roadmaster F. C. Frear took office 30 years ago, there were 3,000 bridges, mostly timber, in the county. Frear noticed the tremendous expense of replacing rotted structural members, of re-decking the floors, and so on. He soon came to realize that if many of the small structures were replaced with concrete and metal-pipe culverts, they would more than pay for the expense of the new material.

Now the saving amounts to even more. For every bridge they get rid of now, a mile of rebuilt bituminous-surfaced highway can be constructed. It is a rule of thumb, but it works. Bridge costs are excessive. In the span of 30 years since Frear has been in office, the number of bridges has been reduced to only 285.

Mechanized equipment was created to lower road-building costs, and in Douglas County they realized that on this basis alone the equipment would pay for itself. The County was caught with little equipment during the war years, because the timber boom had not yet burst, but when it did, orders were placed.

In the last two years a large amount of new equipment has been purchased.

The truck fleet has been boosted to 61 units. Now the County has 10 modern new motor graders, 3 power shovels, a stationary and a portable rock-crushing plant, 2 Athey Force-Feed loaders, an Etnyre asphalt distributor, a Cleaver-Brooks tank-car heater and retort, a bulldozer on an International TD-14, a new TD-18 with a Bucyrus-Erie S-91 scraper, pull graders, compressors, concrete mixers, water pumps, and even 2 pile drivers.

The equipment has been purchased outright, without competitive bids. But there has been very little criticism, because the business has been spread fairly, within reasonable limits, depending on which dealers could deliver.

Many carloads of pipe, mostly Armco round and Armco Multi Plate in sizes up to 96-inch diameter, have been purchased to replace the existing wooden bridges. In one way the replacement of bridges is not recent, because it has been a great part of the life work of Roadmaster Frear.

Today there are 65 miles of pipe cul-

verts in place in the county road system; 46 bridges were replaced in 1947, and 30 more had been replaced by the middle of August, 1948.

Reconstruction Methods

The county road system contains 923 miles of county-maintained highways. In addition, there are some 2,000 miles of private dedicated roads which the County does not have to maintain or

keep repaired.

Of the 923 miles, about 810 are gravel, 100 are bituminous, and the remainder are portland-cement concrete.

The biggest job is obviously the reconstruction of the vast mileage of gravel roads, the realignment of curves, and the widening of the entire highway system. Mile after mile is now being reconstructed by county crews and equip-

(Continued on next page)

DECALS

IDENTIFY YOUR EQUIPMENT WITH COLORFUL DECALS. THE MODERN METHOD OF SIGN LETTERING EQUIPMENT.

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Down "south of the border" a Mexican mining company has chiseled a road right through the heart of the Sierra Madre Mountains. Along its 74 tortuous, twisting miles, ore-laden trucks cross six mountain ranges. Elevations range from 600 to 11,000 feet and temperatures change from 110° to freezing.

GMC Diesels were chosen exclusively for this hazardous hauling job because of their ability to pull bigger pay loads than other engines of comparable size . . . because of their dependable, efficient operation at rapidly changing altitudes. All over America, other GMCs are performing many other different and difficult jobs with equal ease and efficiency.

GMC TRUCK & COACH DIVISION • GENERAL MOTORS CORPORATION



Heavy duty GMCs meet every construction hauling demand . . . with a choice of four gasoline and two Diesel engines . . . single speed, 2-speed, double reduction and tandem rear axles . . . weight ratings up to 90,000 pounds.

GMC

TRUCKS

THE TRUCK OF VALUE

GASOLINE • DIESEL

ment, and sometimes by contract.

Even though the right-of-way is as little as 50 feet wide in some cases, reconstruction work aims to build a 24-foot-wide highway. Depending on the carrying capacity of the soils found, crushed rock and gravel is laid thick enough to form the base for future pavement. Widening, realignment, and the construction of these base courses is today's big business in the Road Department of this county.

When a section is slated for reconstruction, Frear's men first set location and cut stakes for whatever realignment is necessary. The TD-18 and the Bucyrus-Erie scraper then move in, and with the assistance of the bulldozer and a motor grader they re-shape the alignment to take out any of the dangerous spots.

One or two of the county shovels then move into a gravel pit and load out the pit-run material for the lower part of the new base. The County owns a new Lorain 41, a P&H, and a Quick-Way truck shovel. The P&H is soon to be replaced by another Lorain 3/4-yard machine. Some of this material is dug on a royalty basis, but recently the County has purchased tracts of land outright on which valuable gravel deposits are found.

Trucks haul the material to the road, and it is spread in thin lifts over sections usually at least 800 feet long. A motor grader maintains the surface while this work is in progress, so that the compactive effect of that machine as well as of numerous logging trucks can be used. Ultimate compaction is not achieved in this manner, of course, but after the base has been left open to traffic for several months, the soft places can be located and filled.

A small ridge of material is then bladed up at each side of the new base, and a crushed-rock surfacing of several inches is laid. With the first autumn rains, this rock is blade-mixed with earth fines to make a comparatively stable surface.

But the engineers know that this is at best merely a base for future improvement. On some of the new bases which have made their final settlement, improved types of surface have been applied. For this work, the base is of course reshaped to true surface smoothness, and a light tack coat of MC-1 or fuel oil is applied to prime the surface.

Double inverted-penetration bituminous armor coating is then built up. A shot of SC-6 asphalt is applied by distributor at the rate of only 0.25 gallon per square yard. A spreader box on the back of the trucks then assists in laying down a thin coat of 3/4-inch maximum-size rock from the crusher. Theoretically only one thickness of rock is going to adhere effectively to the asphalt, so the boys keep it that thin.

A second 0.25-gallon shot of SC-6 is applied after a roller mashes the rock blanket down. The second rock course is applied, using 1/2-inch maximum rock. This is also rolled in by a 3-wheel Ingram roller. Later on, pneumatic-tire rollers may also be used.

After a year or two of service, the surface of such a road is then usually sealed, using a light RC-4 asphalt and fine screenings. So long as the bases have been built solidly, these bituminous roads are standing up very well.



A new International TD-18 tractor pulls an equally new Bucyrus-Erie S-91 scraper through a cut to grade a section of new road in Douglas County near Roseburg, Oreg.

But here again the engineers know this is merely a beginning. A new Wood Roadmixer and one of the new Wood Preparizers were placed on order only a few weeks before the county was visited, with a view to rebuilding some of the bituminous pavements to even high-

er types of construction.

Costs for two-course penetration treatment run \$1,250 per mile in and near Roseburg, but mount to \$1,500 per mile where Douglas County meets the sea on the Pacific coast.

The County operates a stationary

crushing plant which averages 500 cubic yards of 1 1/2-inch-minus material in 8 hours, and which has produced as much as 1,023 cubic yards in the same period. The plant consists of a Diamond feeder, a Diamond primary jaw crusher, a dual set of conveyors, a 3 x 6-foot Cedarapids shaker screen, a 36-inch standard Symons cone crusher, a 3 x 10 set of Diamond screens, and a 4-compartment transfer bin. Electric power for the conveyors is furnished by an International UD-18 with a 50-kw generator. A Caterpillar D8800 diesel engine drives the jaw crusher, and a 125-hp Allis-Chalmers engine drives the big cone crusher.

Ordinarily this plant is set up after flood season each spring in the Umpqua River bottom where rock overburden is cheap and plentiful.

Many of the county's highways are also being widened, even though men and equipment are not yet available to rebuild the bases. Motor graders are used almost entirely for this work. Four

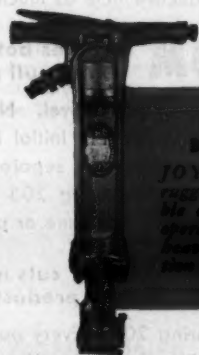
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Use JOY AIR-POWER and TOOLS

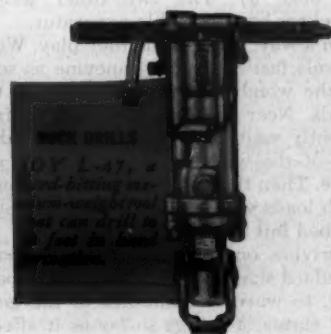
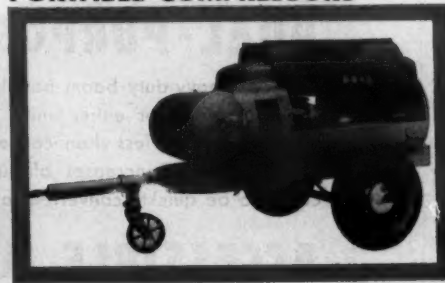
for all-around best performance on DEMOLITION and FOUNDATION JOBS

JOY Portable Compressors and "Silver Streak" Hand Tools make a highly efficient, time-and-money-saving team—the most modern units you can put on the job. They're light, compact and easy to handle, yet ruggedly built for real heavy-duty service. JOY Portables are available in seven sizes, ranging in capacity from 60 to 630 CFM at standard pressure. JOY Hand Tools feature the exclusive "Dual Valve" that makes air do more work, plus cadmium plating for better lubrication, closer tolerances, and prevention of rust and scoring. • Let us show you how JOY equipment can reduce your costs, and produce more work per man-hour. Write for bulletins, and ask for an actual demonstration.

PORTABLE COMPRESSORS



PASSING BREAKERS
JOY K-81, a rugged tool for breaking up concrete and other hard materials.



WIDE DRILLS
JOY L-37, a wide-drilling machine for digging in clay, shale, hardpan, or hard-frozen ground.



SHEETING DRIVERS
JOY Q-81, an adaptation of the K-81 for driving wood or light steel sheeting.



BACKFILL TAMPERS
JOY C-35, an easy tool to handle, yet delivers powerful blows for faster tamping.



SPADERS
JOY M-2, a light tool for digging in clay, shale, hardpan, or hard-frozen ground.

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C. & E. M. Photos

The photo above shows the Douglas County shop area, with a storage shed for timber at left and asphalt-storage tanks and culvert pipe in the background. In the other photo, county road officials stop for a minute on the county courthouse veranda. From left to right, Road Supervisor D. Owens, Judge D. H. Busenbark, County Roadmaster F. C. Frear, and Commissioner L. V. Beckley.

County Road Crews Whip Logging Damage

(Continued from preceding page)

of the newest Austin-Western machines are well suited for this work, according to the men who use them. They drive and steer on all four wheels. They can cut banks away and get in tight places. All bank sloping is always done by motor graders. In addition to those mentioned, the County has a new Allis-Chalmers AD grader, 2 Galions, 3 Caterpillar No. 12's, and a Caterpillar 212.

This equipment is all visited in the field at two-day intervals by a roving fuel and grease truck. Minor repairs are made in the main shop in Roseburg, which covers a 10-acre plot of ground. Repairs are limited to the replacement of parts, and all fine lathe work is sent out to commercial machine shops.

Bridges are replaced by the simple method of tearing them down when the new replacement pipe is on the job site. The same machine which removes part of the bridge timber then rolls the pipe in place, where it is backfilled with earth, rock, and boulders. Traffic is stopped for only a few days and the new job will give cost-free service for many years. The estimated life of many of the heavy-gage asphalt-coated pipes is 75 years.

Traffic Control

Recently, more in self defense than anything else, the County had to hire three full-time weighmasters. A permanent weigh station is located on the North Umpqua Road (featured in the October, 1947, issue of this magazine, on page 5). The two other weight checkers have portable apparatus.

In a way, it is a game they play. Word travels fast by truck grapevine as soon as the weighmasters start roaming the roads. Near quitting time, trucks frequently wait on logging roads or other out-of-the-way spots until the boys are gone. Then they zoom in to the sawmills with loads which often exceed the prescribed but already generous limits.

Drivers on the logging trucks have standard signals, which they use in passing, to warn one another of the general status of things so far as it affects weights. But the weighmasters have a few tricks of their own, and how well they manage to catch the overloads is indicated by some \$2,300 in fines collected in one month from one large outfit.

When the boys find an overload, the driver is cited to appear in court before a justice of the peace. From there on, any one of several things can happen. One justice of the peace frequently lets the drivers off free. Another fines them ½ cent per pound of overload. Still another fines them one cent. Recently a driver whose truck weighed over 100,000 pounds, was hauled before this last mentioned justice. The fine was \$280. Some effort is now being made to standardize the fines at the rate of one cent per pound of overload.

Road after road in Douglas County

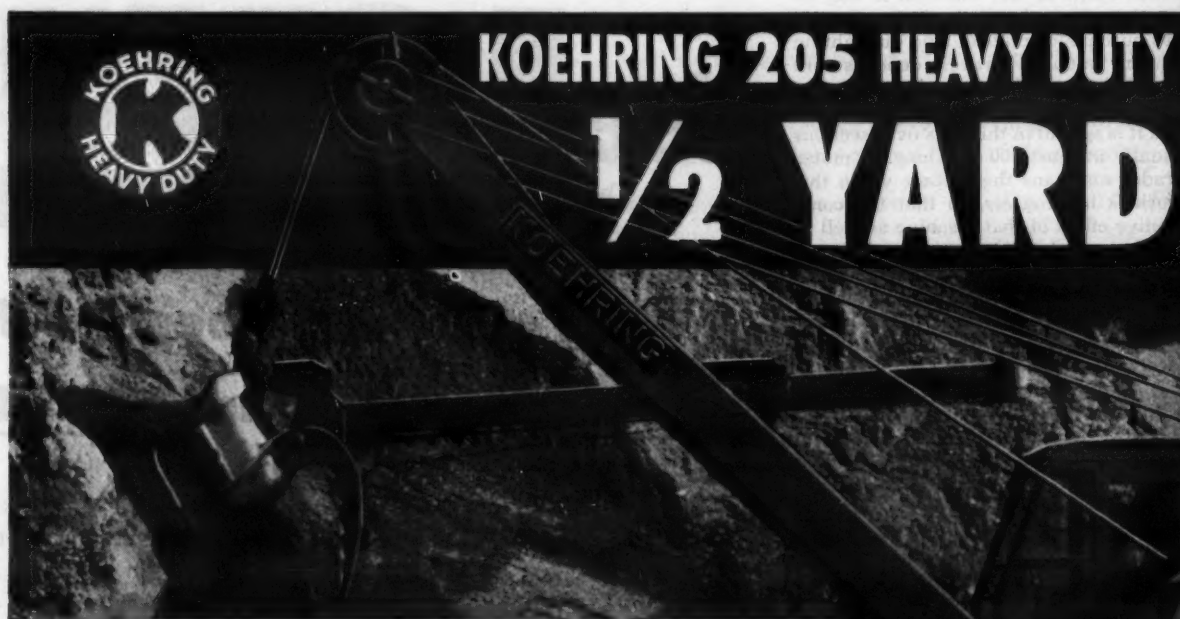
carries from 150 to 200 30-ton loads of logs every day, and the weighing is designed to protect the highways from the 50-ton loads which the law does not allow.

There have been a few instances

where bridges were caved in by logging trucks. But the main river bridges are now being rebuilt to H-20 loading standards. One large bridge was recently built of Wolmanized timber, and another of creosoted timber. Many of

the timber bridges are still in fair condition, largely because they are covered structures. The newer bridges are being designed, prefabricated, and furnished by Timber Structures, Inc., of

(Concluded on next page)



INDEPENDENT TRACTION increases production

With this Koehring heavy-duty 205 shovel, you get 2-speed, independent traction that is free of all other operations. Separate lever controls each crawler . . . lets you travel, swing, hoist, raise or lower boom all at the same time. Whenever you move frequently, or change boom angles to change reach, this quick maneuverability cuts non-productive time as much as 50%.

DUAL-PURPOSE BOOM handles both shovel and pull shovel

Rugged, heavy-duty boom handles either shovel or pull shovel. No need to change booms for either unit. This combination reduces initial investment . . . costs 25% less than conventional units requiring two separate booms. Saves time and increases all-purpose efficiency. Koehring 205 excavator can also be quickly converted to dragline, clamshell, lift crane or pile driver.

ACCESSIBLE MACHINERY cuts non-productive time

Here is another feature you'll like on the Koehring 205. Every part that requires periodic servicing or adjustment is readily accessible. You have less time out for adjustments. Simple, orderly and compact design of shovel boom, boom-hoist mechanism, traction gear case and main operating machinery provides greater operating ease . . . quick adjustments . . . cuts non-productive time to a minimum. You keep production at peak efficiency.

RESULT — these three big advantages can mean more production, lower costs on your shovel work. Remember, too, this 205 is available on crawlers or rubber tires to suit your job conditions. For complete information on the ½-yard 205 . . . or the bigger Koehring ¾-yard 304, and 1½-yard 605 . . . see your local Koehring distributor or write to him for literature.

KOEHRING COMPANY
JACKSONVILLE, FLORIDA
K. J. JOHNSON



Above, Douglas County's stationary rock-crushing plant. At right, Road Supervisor Owens examines a 72-inch Armo pipe to replace a bridge across a near-by stream.



Eugene, Oreg.

Two full-time bridge crews erect these new structures, replace old bridges, and perform routine maintenance on other timber bridges.

Maintenance

Maintenance in Douglas County is mostly a winter and autumn operation. During winter, rock can be crushed.

Motor-grader maintenance work on gravel roads is done in the autumn months, when fines can properly be mixed back in with the larger particles which have worked up to the surface. Owens estimates that the heavy traffic actually wears $\frac{3}{4}$ inch per year off the gravel roads, and this has to be replaced. Pre-mixed bituminous material is also road-mixed, loaded, stockpiled,

and applied to bituminous roads to patch small potholes. Ditches are also pulled in the autumn; the excess material is removed by the Athey loaders and used for filling around new construction.

Two International mowers work full

time in spring and autumn to keep weeds down, and during the summer they fight the Himalayan evergreen and sweetbriar bushes along the roadsides. The County plans to conduct some experiments very soon with Ammate and 2-4D chemicals, in an effort to kill off much of the noxious growth along the roadsides. Scotch broom, which some roadside planters have set out deliberately in other states, is regarded with the same misgiving in Douglas County as poison oak, which is also found there.

In the winter, rock is crushed. There is very little snow removal, except in the mountains, and that is push-plow work. However, rain sets in about October 1 and continues until May 1, and ground water is the worst maintenance problem. There are dozens of small details handled every working day by the maintenance men, and they all involve, one way or another, the control of moisture.

But the Douglas County fight is an active fight. Results can be measured in terms of new mileage reconstructed, bridges replaced, traffic carried. And the whole thing is geared to the economic well-being of the citizens who use these roads, for it is their ability and their desire to pay for these improvements which justifies their very existence. Alert public servants are rendering a real public service in Douglas County.

Low-Cost MOTO-BUG Pays BIG PROFITS

Kwik-Mix Moto-Bug capacity is 1200 lb., 10 cu. ft. . . moves 4 times as much as ordinary hand wheelbarrow. Takes all the pushing and pulling out of wheelbarrow work . . . has power in reverse as well as forward. Speeds $1\frac{1}{2}$ to 4 m.p.h. You also get standard-make 3.9 h.p. air-cooled engine . . . easy steering direct to dual wheel . . . platform body available. Send for complete facts.



KWIK-MIX COMPANY

PORT WASHINGTON, WISCONSIN

Easy-charging LO-BIN Holds 8 to 30 Tons

This handy Lo-Bin Trolley Batcher is only 7 $\frac{1}{2}$ ' high, holds 8 tons . . . easily charged by front-end-tractor loaders. Flared extension panels increase height to only 9 $\frac{1}{2}$ ' . . . capacity to 30 tons. 22 cu. ft. hopper rides on trolley . . . dumps beyond end of track. Quickly dismantled, and moved by dump truck. See complete details explained in new 28-page Johnson Roadbuilders bulletin.



C. S. JOHNSON COMPANY

CHAMPAIGN, ILLINOIS

310 TRENCHLINER* digs extra wide . . . extra deep

For smooth, clean-cut trenches 18" to 54" wide, 15' deep, see this extra-heavy-duty Parsons 310 Trenchliner . . . the largest full crawler mounted trencher made in the United States. Dual booms for flat or step-trench bottom cut as wide as 72". 3 smaller crawler-type Trenchliners also available. Ask, too, about utility-size, 18.5 m.p.h. Model 80 Trenchmobile on rubber tires, digs 4 feet deep.



*Trademark Reg. U.S. Pat. Off.

PARSONS COMPANY

NEWTON, MASSACHUSETTS

Jeep-Mounted Plows

A line of Jeep-mounted snow plows can be obtained from the Schenker Iron Works, 350 Sycamore St., Buffalo 4, N. Y. These light-duty plows are hydraulically operated and are designed for easy attachment or dismounting. They can also be used for backfilling and other earth-moving operations.

The Schenker snow plow has a 24-inch x 6-foot blade. It can be angled into five positions and is fitted with adjustable shoes. Special safety springs are designed to absorb shock during plowing or earth-moving operations.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 43.

Portable Electric Plants

Portable power plants are described in a broadside issued by the Electric Taper & Equipment Co. of Ludington, Mich. Bulletin PMP-248 describes three of the Jackson generators—the 1.25-kva Model M-1; the 2.50-kva Model M-2; and the 5.00-kva Model M-4. Each of these three is illustrated, and text describes features of operation and construction.

Specifications which are tabulated cover the type and voltage of current delivered, capacity, the type and size of equipment operated, overall dimensions, and weight. The broadside also describes the 2-wheel rubber-tired mounting and special maintenance features of the units.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 101.

Electronic Device Finds Buried Pipes

An electronic device for locating underground pipes, buried cables, etc., is manufactured by Fisher Research Laboratory, Inc., 1961 University Ave., Palo Alto, Calif. The Fisher M-Scope can be used to locate the pipe and determine its depth and bends, to locate non-metallic pipes or ducts, and to locate other unknown metallic hazards. Information of this kind is of special value to contractors who are operating excavators, dozers, and other construction equipment over developed areas. According to the manufacturer, the M-Scope can determine whether the object located is large and buried deep, or small and near the surface.

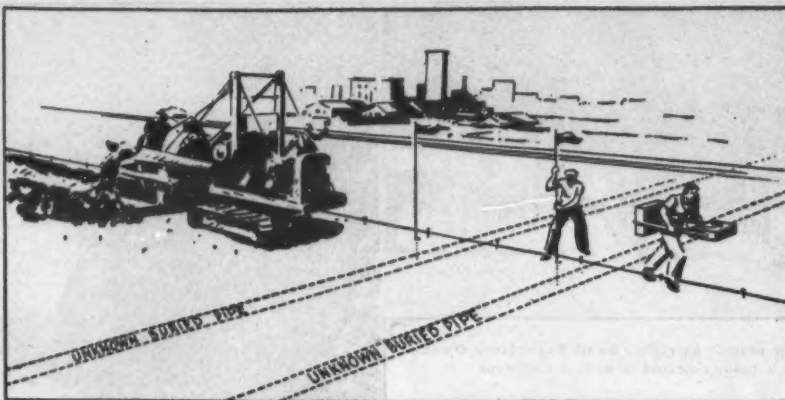
The M-Scope is made in two sizes—a heavy-duty model which weighs 28 pounds, and a lightweight model which weighs 10 pounds. Both units are operated by radio-type dry-cell batteries and have an operating depth of approximately 20 feet. The instrument consists of two specially designed radio units—a transmitter and a receiver. The transmitter sends out a continuous signal which is heard in the earphones at a definite sound volume. When a metal object is located, a change occurs in this volume, informing the operator of the location of the object. Supplementing the earphones, a meter is included with the M-Scope which provides a visual reading, too, of the sound intensity. If one-man operation is desired, special handles are provided which permit using the M-Scope as an induction balance. These handles are designed to hold the transmitter and receiver at right angles, and balanced.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 50.

Osgood Appointments

The appointment of Kenneth Williamson as District Sales Manager is announced jointly by The Osgood Co. and its associate The General Excavator Co., of Marion, Ohio. Mr. Williamson will contact dealers in the states of Arizona, Colorado, New Mexico, Utah, Wyoming, and parts of Idaho, Montana, and Nebraska. He will make his headquarters with the Power Equipment Corp., of Denver, Colo.

Osgood also announces the appointment of James M. Herring as Service Manager and Frank L. Johnson as Di-



The Fisher M-Scope is an electronic device for locating buried pipe, metallic or non-metallic, and determining its depth. It will also spot buried metallic objects which might damage construction equipment.

vision Sales Manager. Mr. Johnson's division includes the states of Washington, Oregon, California, Nevada, and parts of Montana and Idaho. He will make his headquarters in San Francisco.

Heater, Circulator Unit For Bituminous Materials

A heater and circulator for bituminous materials is described in a catalog issued by the Wm. Bros Boiler & Mfg.

Co., 1057 Tenth Ave., S. E., Minneapolis 14, Minn. The Bros unit is available on skids or mounted on a 2-wheel rubber-tired trailer.

A feature of the catalog is a discussion of the heat-exchange unit showing the tar-kettle design of the circulator. This design permits the unit to be left with bituminous material in it, the Bros company explains, because an auxiliary torch can be used to heat the material and start it circulating again. A cut-away drawing shows the inner construction of the unit and the flow of heat through it.

Data are provided on the operation of the Bros Model CS circulator and heater, on the 95-hp power unit, the burners, asphalt pump, outer gas chamber, heater element, the swing-boom pipes, etc. Photographs give more details on how the unit works, and a full-page drawing shows the location of each part in the Model CS.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 97.



One of the primary features designed into every Oliver "Cletrac" crawler tractor is safety . . . safe traveling on dangerous hills and slopes.

The exclusive Oliver "Cletrac" steering principle assures positive traction on both tracks at all times. For example, when turning, one track is speeded up, the other slowed down. Power is never completely disconnected from either track at any time as is the case with "clutch" type steering. Thus there is always a factor of safety with both tracks engaged, providing power and traction where operations must be carried out regardless of conditions . . . added safety on hills and slopes.

It's easier to handle, too, because there is no need to "declutch" when turning.

This exclusive steering principle lets you take full advantage of all tractor power. Since there is always power on both tracks, you can handle bigger loads . . . can balance the side drag of off-center loads . . . get more work done in less time, features that mean greater profit for you.

Investigate the plus advantages you get with an Oliver "Cletrac" crawler tractor. Your Oliver "Cletrac" dealer will be glad to give you the story. The OLIVER Corporation, Industrial Division: 19300 Euclid Avenue, Cleveland 17, Ohio.



Cletrac
a product of



The OLIVER Corporation

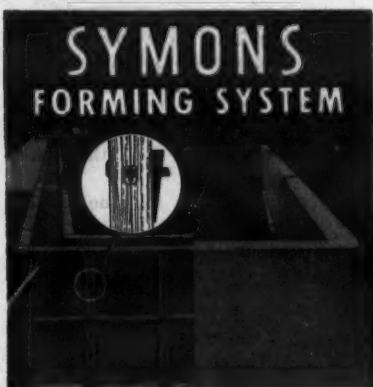
A complete line of Crawler and Industrial Wheel Tractors



"THE SIGN OF
EXTRA SERVICE"

OLIVER

Cletrac
EXTRA SERVICE



SAVES TIME

Inset shows how Symons System saves time in erecting and stripping forms. Bolt passes through 2 x 4 studs and tie loop. Wedge secures the assembly. This simple device cuts forming time 50%.

SAVES LABOR

Harry G. Dehring, Foreman, Taylor Brothers, South Bend, Ind., states "Seven men set up the forms for a 26' x 27' foundation in one hour and fifteen minutes."

SAVES COST

With Time and Labor cut in two . . . Plus savings in nails, spreaders, walers and bracing . . . Plus for greater reuse of forms . . . Costs drop to a new low.

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WRITE TODAY FOR FREE CATALOG

SYMONS CLAMP & MFG. CO.

4251 DIVERSEY AVE.

CHICAGO 39, ILLINOIS





Soil Cement Is Used To Pave a City Street

Three city blocks in Peoria, Ill., have been resurfaced with a soil-cement mixture and an asphaltic coating, as part of an accelerated program of street improvement. The cement stabilizing process itself required 2 days to complete, with cement added at the rate of 9 per cent of the total volume of the mixture. The 1½-inch asphaltic coating was applied approximately 10 days after the pioneering and semi-finish work was completed.

The S. M. H. Construction Co. of Peoria was awarded the contract for the Peoria Avenue project with a figure of \$1.93 per square yard. The work was subcontracted to R. A. Cullinan & Son of Tremont, Ill. Seneca Petroleum Co. handled the asphalt surfacing.

A Caterpillar No. 12 motor grader equipped with a scarifier broke up the old gravel base and bituminous cover. The material was then pulverized by a Seaman Pulvi-Mixer towed by a Caterpillar D4 tractor. Cement for the mixture was hauled to the job site by dump trucks and was fed directly into the Smith spreader used to distribute it. The Pulvi-Mixer then worked the cement into the 6-inch-deep pulverized mixture.

The motor grader shaped the street surface, and water was distributed through the mixture. The mixed material was again churned and more water was applied where necessary for a well balanced preparation. A sheep-foot roller compacted the soil-cement mixture, followed by a 10-ton steel-wheel roller. The street was then shaped to final grade and crown, and a 6-ton pneumatic-tire roller with 13

staggered wheels completed the processing.

The smooth cement mixture was covered with a light coating of bituminous material that served as a tack coat for the heavier asphaltic top. It also served as a seal so that too-rapid evaporation would not cause a chemical reaction within the mixture.

A Seaman Pulvi-Mixer towed by a Caterpillar D4 tractor (left) pulverizes earth in preparation for soil-cement paving on three city blocks in Peoria, Ill. A Smith spreader on the back of a truck (center) distributes cement for the mixture. And a Caterpillar No. 12 motor grader (right) grades the soil and cement mixture before final rolling.

Branch Manager for Thor

William J. McGraw is appointed Manager of the Cleveland, Ohio, branch of the Independent Pneumatic Tool Co., manufacturer of the Thor line of port-

able power tools. He will be succeeded as Manager of electric-tool sales in the New York territory by Ed B. Rosell. Mr. Rosell formerly was electric-tool service engineer in the Chicago branch territory.

NEW SCOOP

1949 Model "C".



OVER 30 BIG IMPROVEMENTS

Regardless of how good a machine performs... the actual user can always suggest improvements. The sensational Model "C" Wagnermobile SCOOP incorporates many of the refinements and improvements actually suggested by you contractors! *Smoother, easier operation permitting even inexperienced men to get more done in a day!*

WAGNERMOBILE PLANETARY DRIVE in each drive-wheel hub takes the usual twisting torque off the axle... permits Wagnermobile SCOOP to stand up under unusually "rough handling."

TRACK extensions and attachments interchangeable with those on Model "B" SCOOPMOBILE. A new machine doesn't mean all new attachments.

LARGER, roomier cab and chassis. Foam rubber seat.

SEAT and cab not over motor.

SHORTER turning radius.

LARGER diameter hoist cable drum to increase cable life.

TRACK vertical to chassis, dumps farther forward.

NEW reversing gear box 1 to 1 ratio.

10:00 x 20—12-ply Single Tires, same traction... better performance.

WEDGE cable anchor in drums.

ROLLER bearing mounted drums.

10-in. Sheave in head piece.

STEEL rod and linkage on automatic clutch safety stop.

SIMPLIFIED hoist control.

SMOOTHER throttle control over rough terrain.

SHIFTING and reversing levers at sides of seat.

INSTRUMENTS entirely visible from seat.

BATTERY easily accessible.

HEADLIGHTS mounted high.

CABLESS model standard with back and top.

SAFETY glass in cab.

MOTOR easy to remove or install.

AIR CLEANER accessible.

STEERING roller bearing mounted.

MANUAL steering (optional) is wheel controlled.

CLOSE coupled hydraulic system.

600 lb. counterweight built-in.

WIDE rear fender protects radiator.

TAPERED rear chassis for better maneuverability in tight quarters.

EMERGENCY brake effective at all times.

STANDARD differential and reversing gear box is available for light, high-speed duty.

EITHER Chrysler Ind. 8-114 or Ford V-8 100 h.p. engine optional.



72-inch bucket cleans up neatly ahead of single tired drive wheels. Traction is not impaired.

Quick change attachments make it a multiple-use machine.

- ✓ CONCRETE HOPPER
- ✓ CRANE BOOM
- ✓ SCOOP BUCKET
- ✓ LIFT FORKS

Extra track extensions to increase discharging heights above the standard 7½ feet.

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Portland, Oregon

Manufacturers of:
Scoopmobile
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Duo-Way Lift
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HALF-BAG MIXERS

Tilting and Non-Tilting

CONCRETE BUGGIES

6½ and 9 cu. ft. sizes
Pneumatic and Steel Wheels

CONCRETE BUCKETS

Bottom Dump
One-yard Capacity

FLOOR HOPPERS

40 cu. ft. size

Products of 40 years
experience

MULLER MACHINERY CO., Inc.
METUCHEN, NEW JERSEY

Seeding Costs Cut In Roadside Program

Ohio Develops Efficient And Economical Methods Of Turf Establishment For Erosion Control

By W. J. GARMHAUSEN, Assistant Landscape Architect, Ohio Department of Highways

† TURF, to have a part in highway consideration, must be established economically, must be maintained easily, and must function satisfactorily. A program which meets these requirements has been the goal of the Ohio Department of Highways for many years, and has finally been achieved.

But before examining the Department's present seeding specifications, let us first trace the history of turf development in Ohio, including early attempts, their faults, and how they were corrected.

Early Procedure

The state's Landscape Department had its beginning in 1933 when the Highway Department realized that erosion was a major problem; a survey at that time showed that 70 per cent of the state's right-of-way was in road-sides. In the beginning, seeding was not a separate specification but was written as a supplement to the construction item of "Finishing Shoulders, Slopes, and Ditches". It was sold as part of the general contract. The seeding specifications were similar to those followed by landscape architects in private practice.

Topsoil was a "must"; 4 inches of it was required on all finished berm work and 2 inches on all slopes. The basis of payment was per linear foot, and the measurement was made along the center line of the road, on both sides of which the shoulders, slopes, and ditches had been completed and accepted. Little or no fertilizer was used. The seed mixture was made up by the Division Landscape Architect and ranged from a few varieties to a shot-gun mixture. (All that can be said for the shot-gun method was that something always did well; it was soon discarded.)

After seeding, all areas except slopes of 2 to 1 or steeper were rolled by a water-filled roller acceptable to the Department. In some cases watering was specified and the contractor was required to show a "stand of green" before he was released from his contract. All maintenance and repair were his responsibility, and the only disaster he could hope to place a claim for was one he could call "an act of God".

This, then, was the early procedure. These were its faults: The general contractor always bid the job high because this work was new to him. He would always sublet it to protect himself against the "unknown" as he thought of it. Costs were also high because of the extra excavation through cuts to allow for the topsoil fill and for furnishing all topsoil. Then too, many projects were held up for acceptance because the seeding could not be completed during the favorable spring and autumn seeding months specified by the Department.

Steps to Lower Costs

To obtain lower seeding bids, the Department decided to let separate roadside-improvement contracts immediately following the grading contract. It was at this time that a seed specification was introduced. The Department had found out that much bad seed was on the market and that it was common practice to "unload" it on highway seeding projects. A specification table

for agricultural seed was worked out within the Department and all seed had to pass this specification before it could be used. The specification had a minimum requirement as to purity, weed seed, germination, and hard seeds allowed. The Seed Laboratory under the Department of Agriculture made the tests for the Department.

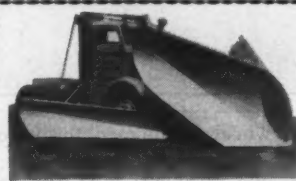
But separate roadside-improvement contracts did not bring about the desired results. Areas often eroded badly before the roadside-improvement contractor could get on the job, as the time allowed for doing the seeding was still only during the spring and autumn months. These eroded areas created another problem, that of equipment. The landscape contractor did not have adequate equipment to correct the

erosion. When roadside work had been a part of the general contract, he had needed only a cyclone type of grass seeder, a harrow, and a few rakes and a shovel. But now he needed equipment for handling topsoil, to replace what had eroded away and bring the area back to grade. In most cases he had to rent equipment or pay for the topsoil in place. The finished grade was too often a polished affair. Prices

increased steadily instead of coming down. Something had to be done.

After much thought the Landscape Department decided upon three important major changes. The first was to include roadside-improvement items with the general contract again. The second was to do away with the topsoil item. And the third was to seed at any time during the year.

(Continued on next page)



There's Always a BEST WAY

That goes for snow clearance, too. It's no more accident that

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enjoy engineer-preference throughout the snow belt. They have won their spurs through Faster • Safer • Cleaner Snow Removal.

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The best time to think about increased efficiency for next year is NOW when the recent snow and ice conditions are still fresh in your mind. We'll gladly supply complete information.

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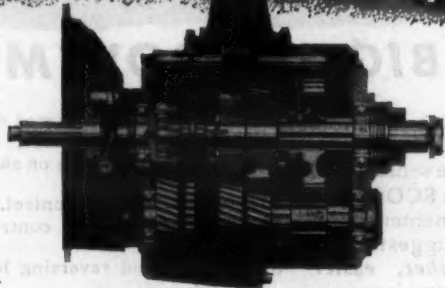
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Made in Eastern U.S.A. by CARL H. FRINK, 1000 Islands, CLAYTON, NEW YORK

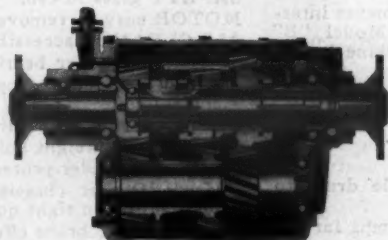


Flatten Out the Hills



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MODEL 3-A-92



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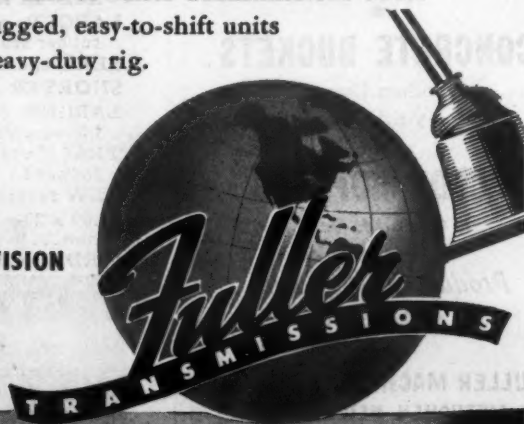
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WESTERN DISTRICT OFFICE (SALES & SERVICE)

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The merits of these three changes were obvious. Including roadside-improvement items with the general contract eliminated the time lost between contracts; consequently erosion of the newly graded roadsides became a very minor item. Because there was no delay, the contractor had the necessary equipment already on the project for use in carrying out the landscape work. Doing away with the topsoil not only eliminated one pay item but reduced the amount of excavation. And seeding at any time allowed the contractor to finish his job. Regardless of when he completed his operations he could be released from his contract with no delay or holdovers to finish his seeding.

These changes necessitated making seeding a separate specification and not a supplement of "Finishing Shoulders, Slopes, and Ditches" as it had been up to that time. So the Department's present specification of "Seeding and Protecting or Seeding Roadway Areas" was made a part of the Highway Construction Manual.

This specification included many new items. Since no topsoil was required, lime and fertilizer were substituted. A straw mulch was required over all seeded areas to insure grass growth. This item was necessary because seeding was done without regard to season.

These three basic changes were made about 1938. They are still in effect.

Current Procedures

To see how this specification works, let us follow it from planning operations through to final acceptance.

The construction plan is prepared in the Division Planning Office, and the Division Landscape Architect checks the plan as to alignment, cross section, drainage, and roadside-improvement items.

Since the main focus in this article is the turf item, let us single it out of the other roadside-improvement items. First, the landscape architect studies the soil profile data to determine if liming is necessary. Let us assume he finds that the cut is deep. The finished grade will be soil that has not been aerated, therefore lime will have to be used. He specifies that 100 pounds of agricultural ground limestone be used per 1,000 square feet of area. Next he specifies that a 10-6-4 fertilizer be applied at the rate of 20 pounds per 1,000 square feet of area. The reasons for using a fertilizer of high nitrogen content are that the soil is low in nitrogen and the straw mulch will use much of this in its breaking down.

He next considers his seed mixture, taking the berm area first. The soil profile data will help him know what to expect in the cut areas. For fills he will have to rely upon the composition of adjacent areas where the borrow pit may be located. He is interested in a low-growing grass and in many cases this will be Kentucky bluegrass; then he will choose a clover for its nitrogen-fixing qualities and a quick-germinating grass, no doubt perennial ryegrass. This mixture also applies to the roadway ditches, median strips, and areas immediately in front of residences. For the backslopes he will use the same mixture but will add a sweet clover and hairy vetch for soil builders. Many times he will use reed canary grass for special areas, and he has found that alta fescue and Ladino clover produce very good results.

He will then specify a straw mulch over all seeded areas, which is to be placed within 48 hours after any given area is seeded. The mulch is to be tied down at once. After these items are estimated he is finished with the construction plan until the contract is sold and construction is ready to begin. At that time he will have jurisdiction over all roadside-improvement items.

In most cases a landscape contractor bids the job with a general contractor and does the roadside-improvement items for him. If this is not the case,

the general contractor may sublet this part of the contract or do it himself. In either case a competent landscape superintendent is furnished by the general or subcontractor to have charge of all landscape construction. If there is any topsoil to be removed, it is salvaged and stockpiled for incorporation into the upper 2 inches of shoulders, slopes, and ditches. The total area covered will depend upon the amount of topsoil available and the length of the project.

Some of the landscape materials will have to be tested and approved before they can be used. This applies to agricultural ground limestone and to grass seed which is still tested for purity and germination. All of this material must be properly stored.

The finished grade has to be at least one inch below the road surface at the metal's edge. As soon as the area to be seeded is satisfactorily loosened the required 4 inches and shaped, the agricultural ground limestone and fertilizer are applied on the surface. These must be applied not less than 24 hours nor more than 48 hours before the seed is sown. They are then thoroughly worked into the soil to a depth of not less than one inch.

All leguminous seeds are inoculated with the proper amount of approved cultures and the specified seed mix is made up. The seed is sown within 24 hours after treatment, at the rate of 4 pounds per 1,000 square feet, and raked in to a depth of 1/2 inch.

Within 48 hours after any given area is seeded, mulching material is placed 2 inches thick, loose measurement, over all seeded areas, and is tied down at once and kept in place by the twine-and-peg method. This method of holding the straw in place works very satis-

factorily. The twine used is binder twine of treated sisal fiber. The pegs can be No. 50d or 60d steel-wire nails or wood pegs 1/2 x 1/2 x 8 inches long.

Three lines running parallel to the pavement are placed so that the first is 4 inches, the second 8 inches, and the third 20 inches from the pavement. The two lines of twine nearest and parallel to the pavement are held by pegs spaced 4 feet apart.

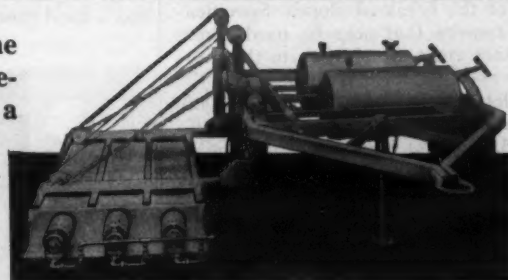
The twine cross ties and pegs extend from 4 inches from the pavement edge to beyond the shoulders for a distance of 10 feet over the break of any fill

slopes. On cut shoulder slopes they extend from 4 inches from the pavement edge to the center of the shoulder's rounded edge.

Cross ties are placed in all ditches and up on all cut slopes, 2 to 1 or steeper, for one-half the slope distance or a maximum of 15 feet measured from the outside edge of the ditch; these measurements are on the slope surface.

Cross ties in ditches must have enough pegs to hold twine approximately at finished grade of mulching material. In addition to the cross ties, (Concluded on next page)

Why Destroy the Base of a Pavement to Apply a New Surface?



White Oil Burning Surface Heaters

These machines offer the quickest, cleanest, most economical method for repairing or resurfacing any bituminous pavement. They melt 1" of old surface in 5 minutes. It can then be scraped away and new top applied without damaging the base course. This has been successful practice for many years.

Made in 2 sizes. Model B-4, illustrated, has 3 x 6' pan. Model B-1 has 6 x 6' pan, with 6 burners and is especially suited for large areas. They can be towed to the job and then moved by hand during operations. Pans have square cutting edges. Dual fuel tanks. Steel wheels, semi-elliptic springs.

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INDIANA

There are many reasons why thousands of contractors and operators prefer Galions. The most important of which is the rugged construction, and fast, positive dumping action of Galion's equalizing double lift arm hoist.

For a hoist and body that will outlast the chassis, make your next dump trucks Galions. Sold by truck dealers everywhere and serviced by distributors in all principal cities.

THE GALION ALLSTEEL BODY CO., GALION, OHIO

Seeding Costs Cut In Roadside Program

(Continued from preceding page)

two lines of twine are placed in the bottom of the ditch on top of the cross ties and parallel to the direction of flow. The spacing between the two lines is one-third the width of the ditch. Pegs are spaced 4 feet on the parallel lines.

Cross ties are placed at the top of all cut slopes 2 to 1 or steeper and 6 feet or over in height, measured on the slope. They extend down the slope for one-half the slope distance or a maximum of 15 feet measured from 4 inches back of the break of slope. Specifications require that pegs be used where any lines cross, in addition to those already specifically mentioned.

Mulch is kept in place during the life of the contract. If some of it is displaced, it is put back down as soon as any damaged seeding or other work underneath it has been acceptably repaired.

After the contractor has carried out all his responsibilities, the project is inspected and, if everything is satisfactory, accepted.

The Landscape Department encourages the contractor to use as much equipment for his operations as possible. One such machine is a straw blower used to place the straw on the areas to be mulched. It has been found to be a timesaver, and it can even be used to advantage on long slopes by working both from the bottom and top of the slope.

Ohio has also set up projects where the contractor can use a Pulvi-Mixer to prepare his seed bed, incorporate his lime and fertilizer, and tie down his mulch. Many man-hours of labor can be saved, since one man operates the machine, and the twine-and-peg method of tying down is eliminated.

Experimental Work

Last spring the Department tried out several projects using an asphalt mulch instead of straw. The specification for using this type of mulch requires that immediately after the seed has been sown and raked in, the seeded areas shall be moistened to a depth of one inch. A total of 200 gallons of water is used per each 1,000 square feet of seeded area. Watering must proceed over the areas in such a way that the asphalt can be applied without tracking over any wetted area by machine or workmen. If rainfall has been adequate, the watering may be omitted at the direction of the engineer. Immediately after a given area is watered and before it dries out, cut-back asphalt mulch is applied uniformly at a rate of 0.25 gallon per square yard. An optimum application temperature of the material at 170 degrees F may be varied by the engineer, but it may not exceed 190 degrees F. The application may be made only with an approved hand spray or by a distributor equipped with a suitable spray bar.

This special cut-back asphalt has to pass the specific specifications set up for this material. It is treated so that it is not toxic to vegetation. It has to be of such character that it will crack without breaking the bond between the asphalt and the soil.

Evaluation of Procedures

Looking back over its work of the past years, the Department has reached these conclusions:

1. Present specifications are workable since they adapt themselves to various situations and allow for the use of many kinds of equipment.
2. The landscape contractors are familiar with the specifications; consequently they are more efficient in doing their work, and at a profit to themselves.
3. This has resulted in lower seeding costs for the Department.

4. Highway construction is judged from a structural and a functional standpoint, and roadside improvement has had a part in both. Structurally the seeding of the roadsides has eliminated the sandpapered finished grade. The grass cover protects the contractor's grading work and he has no reshaping or re-grading to do. Functionally the Landscape Department has been instrumental in flattening the slopes and widening the right-of-way so that maintenance is more easily accomplished.

5. And last, if roads can be judged psychologically as well as structurally and functionally, roadside improvement has a hand there too. For seeded road-

sides are restful and help to eliminate driving fatigue. Perhaps there is no better summary of man's debt to grass than the following passage from John J. Ingalls:

"Grass is the forgiveness of nature—her constant benediction. Fields trampled with battle... grow green again... and carnage is forgotten... grass is immortal... Its tenacious fibers hold the earth in its place and prevent soluble components from washing into the sea. It... modifies climates and determines the... character and destiny of nations... Banished from the thoroughfare and field, it bides its time to return, and when vigilance is relaxed or the dynasty has perished, it silently

resumes the throne... which it never abdicates."

From a paper presented at the Midwest Regional Turf Conference, Purdue University, Lafayette, Indiana, March 1-3, 1948.

Hughes-Keenan Centralizes

The Hughes-Keenan Corp. has moved into a new, modern factory building in Delaware, Ohio. The company manufactures a line of tractor-mounted load handlers under the trade name Roustabout. The present move brings together two of the corporation's three divisions—The Correct Mfg. Co. and the Hughes-Keenan Co. A third division, Burkett Body Co. of Dayton, is scheduled to move at a later date.



NOW IT'S A SNOWPLOW

Plenty of traction and power combined with greater maneuverability make it the ideal outfit for plowing snow from narrow roads, streets, alleys, parking lots, many other places.

NOW A SNOW LOADER

Quickly picks up and loads snow into trucks from wherever snow has to be removed—industrial plants, cemeteries, airports, institutions, streets, alleys, parking lots, gasoline stations.

For All Types of Jobs

Interchangeable Attachments Make The ALLIS-CHALMERS HD-5 TRACTOR-SHOVEL A Versatile Money-Saving, All Season Product

The ATTACHMENTS

- 1 Cu. Yd. Standard Bucket.
- ¾ Cu. Yd. Narrow Bucket.
- 2 Cu. Yd. Snow Loader Bucket.
- 1 Cu. Yd. Rock Bucket.
- Teeth For All Buckets.
- Heavy-duty Bulldozer Blade, narrow and wide.
- V-type Snowplow.

*HD-5 weighs 11,250 lbs. . . . provides 40.26 drawbar hp., 50.2

Data on Fir Plywood Presented in Booklets

Two informative bulletins on fir plywood have been released by the Douglas Fir Plywood Association, Tacoma Bldg., Tacoma 2, Wash. One bulletin contains 24 pages of data on Douglas fir plywood; the other describes the latest commercial standards which have been adopted for Douglas fir plywood.

The data book, called "Facts About Douglas Fir Plywood", discusses how much plywood is being produced, its availability, how it is distributed, how it compares in quality with the pre-war product, how plywood is graded, and the future of this material. It also lists

the classifications of plywood, both exterior and interior types, pointing out how it is marked for grade, face veneer, and back veneer.

The other booklet, "Commercial Standard CS45-48", is the 8th edition of standards and supersedes Standard CS45-47. It discusses tests, size tolerances, inspection, grade markings and certification, and nomenclature and definitions; it discusses the reasons for setting up these voluntary standards and general requirements; it illustrates and explains the various registered grade-trademarks used by the industry.

Copies of this literature may be obtained from the Association. Or use the enclosed Request Card. For the data

booklet, circle No. 73; for the bulletin on standards, circle No. 74.

Use and Care of Wire Rope

Practical information on the use and care of wire rope is contained in a catalog distributed by the A. Leschen & Sons Rope Co., 5909 Kennerly Ave., St. Louis 12, Mo. This 44-page pocket-size booklet contains data on all phases of wire-rope design, construction, handling, and maintenance. It is clearly and simply written and is thoroughly illustrated with photographs, diagrams, and sketches.

The booklet discusses the various kinds of wire rope, emphasizing types

of lays, cores, etc. It tells how to splice wire rope, how to seize ends, and how to attach eyes, thimbles, and other wire-rope fittings. It contains engineering data, formulae, and tables for determining stresses in wire rope, capacities of winding drums, deflections in cableways, and so forth.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 94.

Preload Moves Its Office

The Preload Corp. has moved to 211 E. 37th St., New York, N. Y. Preload designs and erects pre-stressed-concrete structures.



NOW IT'S A SHOVEL

Digs basements, loads surplus material into trucks from roads and streets, loads from stockpiles — sand, gravel, crushed rock, etc. ... for all kinds of excavating and fill work, numerous loading jobs and crane work.

NOW A BULLDOZER

Equipped with a heavy-duty blade, backed by ample traction and power, has the ability to excavate in tough going, backfill, handle all kinds of leveling work.

Jobs the Year 'Round

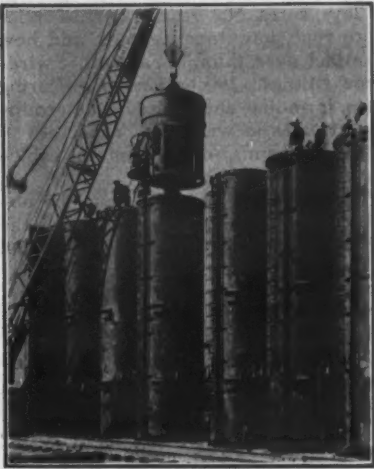
Here's an outfit that brings you an income throughout the year. No need to put it away in the winter and wait for spring. When the dirt and material handling season ends you simply take off the bucket or bulldozer and quickly attach a snowplow or snow bucket—depending on the job to be done.

In every community, large or small, and in the country, there are countless snow removal jobs just made to order for this outfit.

Get all the facts from your Allis-Chalmers dealer ... start earning a year around income NOW!

Not Tied Down To Specialized Duty — Yet Gives Special Performance On Every Job

ALLIS-CHALMERS
TRACTOR DIVISION • MILWAUKEE 1, U. S. A.



Viber Model PX-6 external vibrators are shown here in use by United Concrete Pipe Corp. of Stockton, Calif.

External Vibrators For Concrete Pipe

An external vibrator for use in building large concrete structures such as towers and tanks, and in producing preformed concrete products, is manufactured by the Viber Co., 726 S. Flower St., Burbank, Calif. It is powered by a vane-type pneumatic motor, and is designed to provide the correct amount of amplitude and vibrating speeds over a wide range.

The Viber Model PX-6 external vibrator is 5½ inches in diameter and 12 inches in length. It is cooled by circulation of exhaust air through the housing. The degree of amplitude is varied by the use of rotating weights, available in many sizes. The vibrating speed is controlled by regulating the air pressure. The unit weighs 40 pounds.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 41.

Radiant-Heat System For Highways Tested

An electrically driven radiant-heating system is being tested by the Michigan State Highway Department, reports Commissioner Charles M. Ziegler. The road sections chosen for the test are located on a divided highway, State Route 102, at the west limits of Ferndale. The site was selected because one roadway has a concrete surface and the other has a bituminous resurface; thus two types of road surfaces can be observed under the same weather and traffic conditions.

The heating elements, or grids, are made by welding electrodes to the ends of 98-foot sections of standard 2-inch reinforcing mesh. They are 18 inches wide and are buried 1½ inches under the surface of the roadway. Two grids are used, one for each wheel track. Each grid is expected to produce enough heat for one lane of traffic. The elements are placed in the outside or passing lane of each of the two 500-foot test sections. Temperature of the pavement will be controlled by thermostats which will automatically allow current to flow when the roadway reaches the freezing point. They will remain on until the surface reaches approximately 35 degrees F. Temperature control will be fully automatic. Moisture control will be manually operated, but experiments are now being conducted to find an automatic electrical control which will react to snow and sleet.

Electrical equipment for the 1,000 feet of test section, controls, etc., cost about \$2,500. The entire project is designed to operate on approximately 50 watts per square foot of heating element, and will draw 150 kw per hour. It is estimated that under Michigan electrical rates, the cost will run about 75 cents per hour for the 1,000 feet of roadway being protected. Voltage will be about 65, and with the

elements 1½ inches beneath the surface, pedestrians can cross the roadway with no danger of electrical shock. The electrical work was done by the State Highway Department with the cooperation of the Detroit Public Lighting Commission.

Department engineers estimate that if the system were used in large-scale installations, the cost would be much less than the \$2,500 figure set for this job. And, they add, because it is expected to last the lifetime of the road, or between 20 and 25 years, this means of winter maintenance may prove less expensive than present methods of snow and ice removal.

Booklet on Tar Handling

Information on the use and handling of Tarvia and Tarvia-lithic is contained in a pocket-size field book prepared by The Barrett Division, Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y. This seventh edition of the "Barrett Road Book" is designed to provide

engineering tables and information helpful to contractors and engineers using Tarvia road tar and Tarvia-lithic bituminous concrete.

The booklet discusses the grades of Tarvia, typical uses, quantities required per mile at various rates of application, distances covered by distributors of various sizes at specified quantities of material per square yard, weights of aggregates, and other technical informa-

tion of use to designers and road planners. It contains tables of conversion units and thermometric equivalents, and gives instructions for unloading tank cars. It also describes, step-by-step, the procedure to follow in laying various types of road surfaces, and in stabilizing bases with Tarvia.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 96.



Write for details.

HENKE MFG. CORP., Janesville, Iowa

Henke Rotary Power Sweeper

Designed for sweeping bituminous roads before retreatment, and removing excess screenings from base courses prior to surfacing. Also used in street sweeping and snow removal. 7 and 10 ft. sweepers available with patented full circle swing and 56 in. tread. 10 ft. sweeper consists of two 5 ft. oscillating cores.



Mammoth O'Sullivan Dam (formerly called Potholes Dam) took more than 9 million cu. yds. of earth and rock fill. Toughest hauls on this rugged project were assigned to 22 GM Diesel-powered Euclid bottom dumps in the fleet owned by contractors Lytle, Amis and Green. Six-mile round trips—with half the distance on an 8% grade—were completed in an average of 23 minutes, including loading time.

**TOUGH
JOBS
MOVE
FASTER**

with
GM DIESELS



ALL OVER the country you see General Motors Series 71 2-cycle Diesels taking over the hard jobs and setting records for speedy completions.

In this case, on the 8% down-grade at O'Sullivan Dam, **braking capacity** of the engine was just as important to the contractors as "power at every downstroke." Full compression braking makes the GM Diesel powered "Eucs" easier on brakes and linings.

These 2-cycle Diesels also deliver high torque

that gives trucks and tractors fast get-away and smooth up-grade pull even with a punishing load.

Add these advantages to their low fuel costs and their exceptional dependability, and you have some of the reasons contractors everywhere are saying, "We pick GM Diesels for our toughest assignments."

Before you specify power for any equipment, get all the facts. Call your local GM Diesel dealer, or write us direct.

DETROIT DIESEL ENGINE DIVISION

SINGLE ENGINES... Up to 200 H.P.

DETROIT 30, MICHIGAN

MULTIPLE UNITS... Up to 800 H.P.

GENERAL MOTORS

DIESEL BRAVN WITHOUT THE BULK



Navigation Project Includes New Locks

**Will Give 7-Foot Channel
On 76 Miles of River;
First of Three Structures
Provides 27-Foot Lift**

(Photo on page 1)

LOCK No. 1 on the Pearl River in Louisiana is one of three such major structures included in a navigation project to provide a 7-foot-deep channel from the Gulf of Mexico to Bogalusa, La., via West Pearl River, a lateral canal, and Pearl River. The overall project includes dredging and straightening the lower 30 miles of West Pearl River, digging a 20-mile lateral canal, and constructing two submerged dams or sills for controlling the depth of channel. This big undertaking was started back in 1938, but work was suspended during the war. Now the project is again active, and when it was visited, work was moving steadily along on Lock No. 1 to complete it by the end of 1948. Lock No. 2, 11 miles farther upstream, is also under construction, and is expected to be finished by October, 1949.

Pearl River was utilized for navigation by stern-wheel steamboats as far north as Jackson, Miss., for movement of cotton and general merchandise during the period from 1870 to 1905. This travel reached a maximum in 1895. But after the coming of railroads into the valley, the river fell into disuse for steamboat navigation. Instead, for about twenty years following this period, the river was used extensively for floating and rafting logs to sawmills near the mouth of the river. But this operation too was discontinued as soon as timber reserves in the tributary area were depleted.

However, the climatic and soil conditions in the area comprising southeastern Louisiana and southern Mississippi are conducive to the rapid growth of timber. And a flourishing stand of second-growth trees, suitable material for the manufacture of paper and pulpwood products, soon developed in the area. As a result, a large paper mill and other industries which use second-growth timber have been established at Bogalusa, La. Since many of the raw materials and products of the paper-producing industry are bulky and can be moved most economically by barge, modern water transport in the area will be of great economic importance. The areas adjacent to Pearl River also contain deposits of sand and gravel which are needed in large quantities in the New Orleans metropolitan area and can be transported directly to that city by an all-water route. This economical movement of sand, gravel, logs, pulp-

wood, waste paper, chemicals, etc., is the principal result to be attained by the improvement of the Pearl River.

The project for this improvement was approved by Congress on September 23, 1937. It is under the direction of the Corps of Engineers, with the Mobile, Ala., District supervising design and construction. It provides for a slack-water channel at least 7 feet deep, 100 feet wide in the river channel and 80 feet wide in the canal section, from the mouth of West Pearl River at the Rigollets to Bogalusa, La., about 60 miles above the mouth. The general plan for the project provides: (1) for improvement of the channel of the lower reach of West Pearl River from its mouth to a point about 29 miles upstream, by dredging the bars, snagging the ob-



C. & E. M. Photo

This overall view of the work trestle at Lock No. 1 on the Pearl River shows a Wiley whirley lifting sheeting, a Lorain crane lifting bridge timbers for the trestle, and a pole truck bringing in piles.

structions, and cutting the bends in the river; (2) for construction of a lateral canal about 20 miles long, with appurtenant structures and levees, along the

west edge of the flood plain from mile 29 to Pearl River at Pools Bluff, mile 49; and (3) for improvement of the

(Continued on next page)



Above photos show New Holland Double Impeller Breaker installation at Hudson Stone Products Company; also . . . actual size material as it comes from delivery conveyor before screening. Notice uniformity of shapes and sizes. This is the result of "Dual Impact" action! Breaking force evenly distributed assures accurate sizing without irregular shapes—even with slabby material!

*"Crush more material to
desired size with less power"*



says
TOM HUDSON, owner,
Hudson Stone Products Company,
Lynchburg, Ohio

● Early in 1947, Tom Hudson modernized his plant. He replaced three units with a single New Holland Model 3030 Double Impeller Breaker.

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Navigation Project Includes New Locks

(Continued from preceding page)

channel of Pearl River from Pools Bluff to Bogalusa, about mile 60.

Through its lower reaches, Pearl River and its several alternate channels flow through a flat delta swamp several miles in width which is entirely inundated during high water. The river banks are low, and the channels are extremely crooked with a series of oxbow bends. It was therefore necessary to by-pass about 36 miles of the worst portion of the natural channel with a lateral canal constructed along the west edge of the flood plain; to concentrate the fall of the river at certain locations in the canal; and to overcome this fall with three locks. The canal route is therefore about 15 miles shorter than the route along the natural channel. At the locations selected for the locks, earth plugs were left in the alignment of the canal in order that the locks could be constructed in the dry. The lock sites were isolated from floodwaters of the river by temporary levees.

The improvement of the channel of West Pearl River from its mouth at the Rigolets to the lower end of the canal was accomplished during 1938 and 1939, and the canal levees and a spillway were constructed during 1939-1940 and 1941. Afterwards, work on the project was suspended during the war.

Waterways Structures

The project includes three locks, Nos. 1, 2, 3, with lifts of 27, 15, and 11 feet respectively. These are to be constructed in the canal, to provide a slack-water channel from low-water elevation 3 feet above sea level below Lock No. 1, to elevation 56 above Lock No. 3. The locks are to be 65 feet wide and 310 feet long, with 10 feet of water over both the upper and lower sills at low water. With the arrangement of the locks, the stages of West Pearl River below Lock No. 1 will range in elevation from 3.0 feet low to about 27.0 feet high; the pool elevations between Lock No. 1 and Lock No. 2 will range from elevation 30.3 low to 32.0 feet high; between Locks 2 and 3, from 45.0 low to 52.0 high; and above Lock 3, from 56.0 low to 67.0 high.

Between Locks 1 and 2, the canal is isolated from direct influence of all river channels, but receives the run-off of 27 square miles. It was therefore necessary to construct a spillway in the levee to discharge the run-off from this area. The spillway has a crest 200 feet in length and is of concrete construction. It was built in 1939.

Between Locks 2 and 3, the canal crosses Bogue Chitto River, a tributary of Pearl River. Here it was found expedient to provide for an overflow sill or dam across the river to stabilize the low water at a minimum elevation of 45.0. Provision is likewise made to stabilize the low water of Pearl River above Lock 3 at a minimum elevation of 56.0 by a similar sill to be constructed across Pearl River just below the entrance of the canal into Pearl River.

The plan of improvement also includes the clearing of about 500 acres of land that will be flooded by the pools of Locks 1 and 2.

Lock No. 1

Lock No. 1, the construction of which is the subject of this article, was built by the Maxon Construction Co. of Dayton, Ohio, under a \$1,796,000 contract. It consists essentially of four gate blocks, two on each end of the lock, and lock walls connecting the gate blocks. The blocks support the upper and lower lock gates and contain the valves and the 6 x 7-foot culverts for filling and emptying the lock and the gate-operating machinery. The four blocks, one at

each corner of the structure, are 77½ feet long and 21 feet wide at the top. The lower blocks are 51 feet high, extending from minus 16.0 elevation to plus 35.0 elevation at the top. The blocks are supported by wood bearing piles about 40 feet long.

The sides of the lock chamber are (Continued on next page)

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C. & E. M. Photo
A Willey whirley, operating from the work trestle Maxon Construction Co. built for its lock job on the Pearl River, lifts a man up to the top of the sheet piling to guy in the next sheeting.

formed of interlocking heavy Z-type steel sheet piling, 70 feet long, driven to form two opposite walls. The piles have a penetration of about 28 feet below the floor of the lock. At the floor level the walls are braced apart with a system of reinforced-concrete beams, $4\frac{1}{2}$ to 6 feet wide and $3\frac{1}{2}$ feet thick, adjacent to the lock walls, and reinforced-concrete struts $3\frac{1}{2}$ feet square on 16-foot centers. The intervening spaces between the beams and struts are filled with coarse gravel to form the lock floor.

The upper portion of the steel pile wall is fastened by tie rods to an anchor wall placed in a compacted-earth fill 70 feet back from the lock wall. The anchor wall is of the same Z-type piling used in the lock wall, and is 12 feet long. The tie rods are $2\frac{1}{2}$ inches in diameter with an upset to $3\frac{3}{4}$ inches on the ends for carrying the turnbuckles and nuts. The tie rods are connected to the walls at elevation plus 14.5 feet.

Excavation

When the Maxon Construction Co. began operations in May, 1947, the first step was to construct a 2-mile gravel access road in to the job site from Louisiana State Route 58. When this was completed, heavy construction equipment was brought in and delivery of materials got under way. A great hole for the lock was dug in the earth plug separating the canal from the river. This hole had a maximum depth of about 42 feet from average ground level of 28.0 elevation to minus 14.0 elevation down in the lock chamber. It was 537 feet long between toe of slopes which ranged from $1\frac{1}{2}$ to 1, to 3 to 1. While the lock chamber is 65 feet wide, the width of cut required by the construction operations was 146 feet. The soil was mostly sand and gravel, with a 6-foot stratum of clay on the surface, and with an occasional deposit of quicksand.

Excavation started November 1, 1947. The contractor concentrated first on the lower gate block, then the lock chamber, and finally the upper gate block. Earth was moved by two Caterpillar No. 70 10-yard scrapers pulled by International TD-18 tractors, and by draglines. The latter also loaded the scrapers after the first few layers of

dirt were removed from the top. Digging was done by a Lorain 820 with a 60-foot boom and a Page $1\frac{1}{2}$ -yard drag bucket, and a Link-Belt Speeder with a 60-foot boom and a $\frac{1}{2}$ -yard drag bucket. The Lorain usually loaded the scrapers which were employed on the long hauls carrying material away to storage areas. Clay, for instance, was required for the 21-foot-high compacted fill to go over the tie rods, anchor walls, and along the sides of the cut.

When the Lorain was not loading the tractor-scraper units, it was casting material out of the hole to the Link-Belt Speeder, farther up on the slopes, which in turn cast it still higher. From the very bottom of the hole the excavated material was handled as many as four times in a series of casting operations to reach the top of the bank.

Wellpoint systems were necessary, during the excavation and afterwards, in order to keep the ground-water level down so that construction might proceed in the dry. A Griffin wellpoint system with 1,600 feet of 10-inch header



C. & E. M. Photo

Concrete for the Maxon lock job was hauled in 4-yard Dumperette bodies mounted on Mack trucks. But since the pours were not very large, only 2 yards were carried at a time.

pipe was used, to which were connected $16\frac{1}{2}$ -foot risers. Three different stages were required, with the header line first set at elevation 14.0 or on the plane

of the tie-rod anchors, and finally down to minus 5.75. Most of the pumping was done by three American 75-hp 10-inch-suction 12-inch-discharge pumps, rated at 4,000 gpm at a head of 72 feet. Another American 40-hp 12-inch pump, 4,000 gpm at a 35-foot head, was used over an open sump. Once ground-water table was stabilized, two 75-hp pumps were sufficient.

At the ends of the cuts the slopes received additional protection with sandbags to prevent erosion, and to keep material from sloughing into the hole. This was highly important, for a slide might have caused great damage to the work in progress.

Pile Driving

The MZ-38 steel pile sections, for both the lock chamber and the anchorage wall, were shipped by rail from the Carnegie-Illinois Steel Corp. plant at Pittsburgh, Pa., to a siding of the Gulf, Mobile & Northern Railroad at Tall-sheek, La. From there they were hauled

(Continued on next page)

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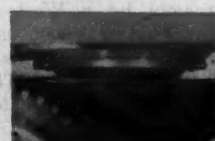
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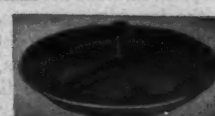
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Navigation Project Includes New Locks

(Continued from preceding page)

7 miles to the job site on pole trailer trucks, 60 feet long. The steel piling as well as the tie rods were given two protective coats of Inertol paint to prevent rusting. The 12-foot-long piles for the anchorage wall were driven by the Lorain crane using a Vulcan No. 2 steam hammer powered by a 60-hp vertical boiler. No leads were necessary.

The long up-to-70-foot steel piling for the lock chamber walls was driven from a work trestle which was constructed along the job center line. A work road was built down into the hole from the west end, tying in to the trestle. The timber falsework was 466 feet long, with an additional 50 feet of deck and track extending back into the cut at the west end to connect with the road.

Constructed of timber, the work trestle consisted of five-pile bents spaced on an average of 14-foot centers and capped with 12 x 12's, 22 feet long. The trestle had a maximum height of 38 feet above the bottom of the cut, and was strongly cross-braced both longitudinally and laterally with heavy timbers. Between the caps were 8 x 12 stringers on 3-foot centers, while along each side 15-inch steel I-beams were placed to carry the weight of the gantry working from the trestle. The steel rails for the gantry rested on 6 x 8 ties placed on 2-foot centers. The deck between the rails consisted of 2-inch planking.

The gantry itself was a Wiley 75-14 whirley, equipped with an 85-foot boom plus a 15-foot jib extension to handle the long piles for the lock wall. It had its own oil-fired 60-hp vertical steam boiler. The supporting base had four legs with wheels at the bottom to ride along the 18-foot-gage rails. The gantry frame was high enough to provide a 12-foot vertical clearance for vehicles passing under the whirley as they moved along the work trestle.

Working from the trestle, the whirley set the piles for the lock chamber walls, guying them first precisely on all four sides, and then driving them with a No. 1 Vulcan hammer. Both the Lorain crane and the Wiley whirley helped in the construction of the work trestle, and the Lorain was used in building timber falsework out along the sides. This other falsework supported the tie rods from the anchorage walls until the backfill was placed behind the chamber walls.

Timber Foundation Piles

At the four corners of the lock, timber foundation piles were driven to support the gate blocks. A total of 1,308 piles was required, of which 172 were driven on a 4½ to 12 batter, and the rest were driven plumb. The plumb piles are 35 to 40 feet long, while the batter piles are 45 feet long. Driving was done by a Vulcan No. 1 hammer suspended in 54-foot swinging leads from the boom of either of the crane rigs. Jetting accompanied the driving, and water for the 3-inch jet line was pumped from the upper pool by a Westco 3-inch pump. The latter was also used later in the construction operations to provide water for the concrete. The average spacing of the timber piles is on 3-foot centers both ways.

Pile driving, both for the timber foundation piles and the steel wall piles, started at the lower or east end of the job, and proceeded west or in an upstream direction. The bents in the work trestle were so spaced that they did not interfere with the construction of the concrete cross struts in the lock chamber below. The timber foundation piles were cut off so that they would project 2 feet into the concrete gate blocks.

Concrete Set-Up

While the piles were being driven, the contractor set up a Strayer 1-yard portable concrete plant at the southwest corner of the site, close to the work road leading to the trestle. Sand and gravel for the mix was furnished by Kirett & Reel of Sun, La., about 15 miles from the project. The material was delivered to the job by trucks, and either stockpiled or dumped directly into the receiving hopper at one side of the plant. An enclosed elevator, with a swivel chute at the top, raised the aggregate from the hopper and discharged it into the proper bin. Or else a crane loaded the bins directly from the stockpiles.

To the rear of the concrete plant was a frame building where the Lone Star bag cement, shipped from New Orleans, was stored. The cement was air-entraining with Vinsol resin interground at the mill. If additional air entrainment was needed, Protex was added to the batches. Lime dust supplied by the National Cement Co. of Birmingham, Ala., which was added to the mix to fill a deficiency of fines in the sand, was also stored in the cement house.

The plant also contained a Link-Belt Ice Crusher-Slinger which provided ice for the mix. The ice was put in the mixing drum in sufficient quantities so that the temperature of the concrete did not exceed 80 degrees F as it was placed in the forms. After the concrete was mixed, the batches were discharged from the drum into the 4-yard Dumpcrete bodies mounted on Mack trucks. On this job, where the pours were not very large, only 2 yards of concrete were carried at a time.

The plant was located high enough so that the concrete was discharged into the truck bodies as the vehicles backed into a cut alongside. The trucks then backed out on the trestle, passing under the whirley, and discharged their contents into Blaw-Knox 1-yard concrete buckets. The buckets were picked up from the trestle floor by a crane, and swung out over the forms. As the concrete was placed in 5-foot lifts, it was vibrated by Mall vibrators. The reinforcing rods for the concrete were supplied by Truscon Steel Co. of Dayton, Ohio.

Shop Buildings

Form panels for the larger concrete pours were made up in the carpenter shop, which was equipped with a Mar-

vel draw-cut saw, a DeWalt wood-worker saw, and a Black & Decker portable hand saw. The panels were 18 feet long with a maximum height of 6 feet 3¼ inches, and consisted of 1 x 6 tongue-and-groove stock backed with 2 x 6 studs on 16-inch centers. They were semi-cantilever in type, with dou-

ble 2 x 6 wales anchored at the bottom. Universal ½-inch Spi-Ro-Loc tie rods were placed on an average of 3-foot centers.

Both the form panels and the concrete buckets were usually handled by the Lorain crane with the 75-foot boom, (Concluded on next page)



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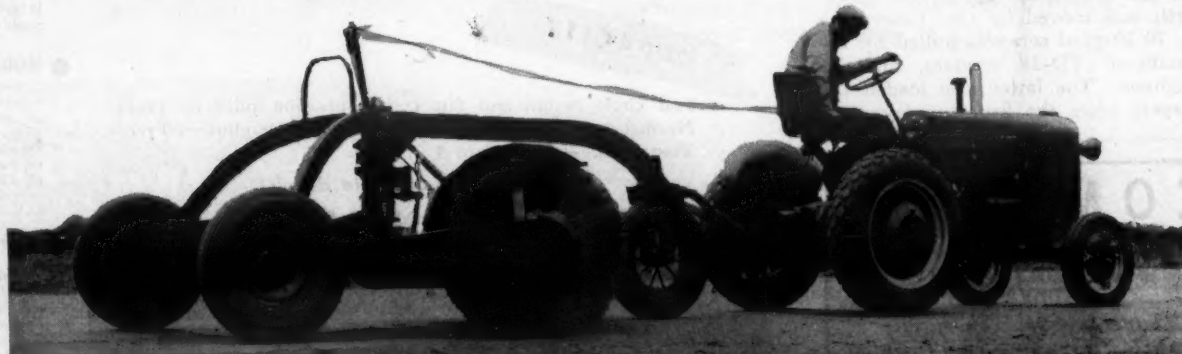
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which also operated from the work trestle. It did not use its crawler treads but was mounted on a special platform. This was made with two 12-inch channels on each side, topped by a ½-inch cover plate, with timbers placed across these members to provide a deck. The platform was 30 feet long and moved on wheels riding on the gantry rails.

At the northwest corner of the site was a sheet-metal building containing the electric-power-plant equipment for the job. This included three Buda 150-hp diesel engines driving Century 125-kw 60-cycle 3-phase electric generators. They furnished power for operating the tools in the carpenter shop, and for running the electric pumps connected to the wellpoint system and the sumps—also for the lighting system for the entire job.

Final operations in the construction of the lock included hanging the miter gates, which were fabricated by the American Bridge Co. of Ambridge, Pa., and placing the fill directly in back of the wall piling for the lock chamber. This fill was puddled as it was placed up to elevation 14.25, covering over the horizontal tie rods. As the fill went in, the superstructure of the temporary timber falsework which supported the tie rods was removed—that is, the caps and cross members. But the piles themselves were left undisturbed in the fill.

To develop bearing on the anchorage, a compacted-fill embankment was continued up from elevation 14.25 to elevation 35.0. This embankment is 33 feet wide on top, with the front edge of the crown 56 feet back from the sheet pile wall of the lock chamber. Around the anchorage piles the fill was compacted by Ingersoll-Rand backfill tampers powered by two Schramm compressors, a 210-cfm and an 85-cfm model. Higher up, the fill was compacted by a sheepsfoot roller. One of the last steps was the removal of the work trestle.

Quantities and Personnel

The major items in the Lock No. 1 Pearl River project included the following:

Excavation	165,000 cu. yds.
Fill	133,400 cu. yds.
Compacted fill	20,650 cu. yds.
Puddled fill	10,950 cu. yds.
Timber piling	47,000 lin. ft.
Steel sheet piling	83,910 sq. ft.
Concrete	13,000 cu. yds.
Reinforcing steel	328,000 lbs.
Structural steel	343,100 lbs.
Steel forgings	390,026 lbs.
Steel castings	57,800 lbs.

The Maxon Construction Co. employed an average force of 120 men working two shifts under the direction of Tom Scott, General Superintendent, with J. V. Bower as Field Superintendent.

For the Corps of Engineers, Department of the Army, Willard F. Simpson was Resident Engineer on the project. The Mobile District is headed by Col. Joseph J. Twitty, District Engineer. Col. Mason J. Young is Division Engineer of the South Atlantic Division with headquarters at Atlanta, Ga.

Locks 2 and 3

Lock No. 2 is similar in dimensions



C. & E. M. Photo
Tom Scott (left) was General Superintendent for Maxon Construction Co. on the Pearl River lock job. Willard F. Simpson was Resident Engineer for the Corps of Engineers.

and in design to Lock No. 1, except that the lift is only 15 feet and the gate

blocks are to be supported by spread footings instead of by wood bearing piles. A contract for Lock 2 in the amount of \$1,613,563 was awarded January 8, 1948, to T. L. James & Co., Inc., of Ruston, La.

The contractor has completed the access road and the construction office, but work on the lock itself is being delayed due to difficulty in securing steel-sheet diaphragm piling for the foundation of the gate blocks.

Plans and specifications for Lock No. 3 are nearing completion, and it was expected that the job would be advertised about November 15, 1948, and that bids will be received this month.

Heavy-Duty Semi-Trailers

Bulletins on a line of heavy-duty semi-trailers are available from the Fontaine Truck Equipment Co., 3829 First Ave., N., Birmingham 1, Ala. These include the Model S single-axle trailers in 10 and 15-ton capacities; the Model TA double-axle trailers in 15,

20, and 25-ton capacities; the Model C8 single-axle trailers in 15, 20, 25, and 30-ton capacities; the double-axle Model C16 trailers in 45, 50, 60, and 75-ton capacities; and the Model RB double-axle trailers in 15, 20, 25, 30, and 35-ton capacities. All models except the TA can be supplied with level or drop platforms. Fontaine has also put out a bulletin on its No-Slack line of fifth wheels.

Each of these semi-trailer models is described in a 4-page folder which provides complete information on capacities, specifications, and features. Specifications cover the number of wheels, size of tires, construction of axles, brakes, floors, dimensions, standard equipment, and so forth. Component parts of the trailers are discussed in detail, including the goosenecks, frames, brakes, and axles. The folders also describe special equipment manufactured by the Fontaine company.

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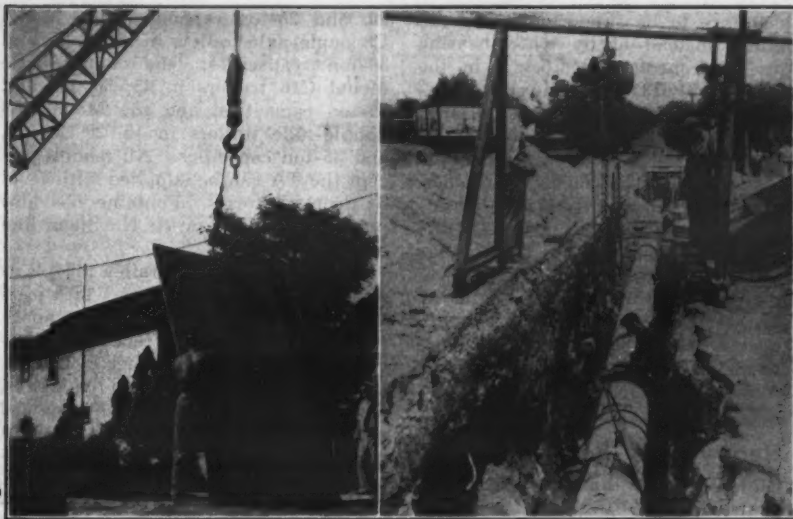
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Gas Main Laid, Welded With Time-Saving Rigs

Portable, Overhead Hand Crane and Prefabricated Steel Bridges Speed This 7½-Mile-Long Project

THE construction of a 24-inch all-welded gas main from Hunt's Point in The Bronx, New York City, to Mount Vernon, N. Y., was speeded up by the use of several novel devices. Among them were some portable welded steel bridges to carry passenger and vehicular traffic at street intersections; and a portable overhead hand crane. The project runs for 7½ miles and was performed by Slattery Construction Co.

Overhead Crane

The sawhorse type of crane designed to straddle the trench was constructed from sections of 6-inch pipe welded together. A chain hoist was hung from the center of the crane, and the entire unit was mounted on wheels to simplify moving it as the job progressed. After the sections of gas pipe were delivered to the job and laid in the trench by a truck-mounted crane, all subsequent handling of the pipe was done by the overhead crane. This kept the larger truck unit from being tied up for periods of time while the pipe sections were being welded and left it free for other operations.

As the 40-foot 2½-ton pipe sections were laid in the trench, slings were wrapped around them and connected to the chain hoist of the overhead crane. This unit positioned and held the pipe



Hobart Brothers Co. Photos

Prefabricated portable steel bridges, like the one in the first photo at left, carried traffic at street intersections on the Slattery gas-main construction job. The second photo shows a portable overhead hand-operated crane of welded 6-inch steel-pipe sections which handled the gas pipe during welding. In the third photo, an alignment clamp is in place over the edges of adjoining lengths of gas pipe. And in the fourth, two operators simultaneously bell-hole-weld the plain end joints, each working down from the top.

in place during welding operations.

Method of Welding

After the pipe was lined up, a cam-

actuated alignment clamp was placed over the edges of adjoining lengths of pipe, and clamped into position. To
(Concluded on next page)

Altimeters

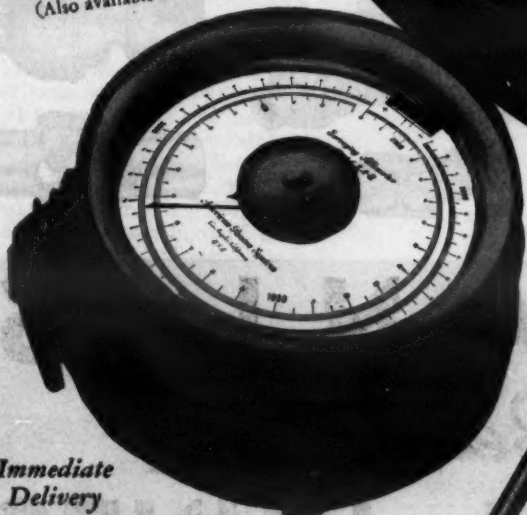
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Type SA 3: In 10' intervals
Range 15,000' (-500' to 14,500')
(Also available in meters)



Immediate
Delivery

AMERICAN PAULIN SYSTEM

Manufacturers of Precision Instruments

1847 SOUTH FLOWER STREET, LOS ANGELES 15, CALIFORNIA

Altimeters

Price Complete
\$200

See your dealer
or write direct
for information

Accessories include
carrying case, hand
and shoulder straps,
magnifier, thermometer,
and operational procedures.

**ECK MILLER OF
OWENSBORO,
KENTUCKY**



DOES IT WITH A ROGERS

using a Rogers Model D-35-D and a Pole Type Trailer loaded with 80,000 lbs. of steel tank 67 feet in length. The conventional trailer mounts a fifth-wheel type of bolster which supports the front of the load and tows the pole trailer which carries the rear of the load.

A. B. BURTON CO., Inc.
OF LYNCHBURGH, VA.



DOES IT WITH A ROGERS

Moving this heavy Northwest power shovel from job to job presents no problem to the A. B. Burton Co. when they have their D-50-D Rogers semi-trailer to rely upon.

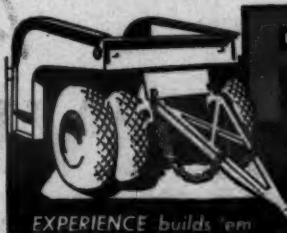
**DUIE PYLE OF
COATSVILLE, PA.**



DOES IT WITH A ROGERS

Another 40 tons of tank 70 feet in length is rapidly transported the 70 mile distance from Lancaster, Pa., to Telford, Pa., with a Rogers popular D-35-D semi-trailer and a PT-15 pole trailer taking the job "in stride".

and YOU CAN DO IT WITH A ROGERS trailer, whether the jobs involved require the hauling of light, medium or heavy equipment. Why not learn in detail just what Rogers has to offer. Write TODAY for your copy of the NEW CATALOG.



ROGERS
BROS. CORP.

DESIGNERS and BUILDERS OF
HEAVY DUTY TRAILERS
SINCE 1915

EXPERIENCE builds 'em

PERFORMANCE sells 'em



108 ORCHARD ST. ALBION, PENNA.

speed field-welding operations, the $\frac{3}{4}$ -inch-thick pipe was delivered to the project already beveled. Plain end joints were bell-hole-welded by two operators working simultaneously on both sides of the joint. Each welder made a complete bead working from the top down. All three beads were laid in this same manner. Approximate welding time on each joint was $1\frac{1}{4}$ hours, and about 5 pounds of Hobart electrodes were used on each.

Testing the Welds

The welds were tested at 150 pounds of air pressure by means of a "pig", a short section of pipe equipped with two rubber flanges set a distance apart, with an air line connected to the flanges and to the air space between them. When these flanges are inflated, the center section is sealed off, causing the air pressure in the center section to be exerted against the weld joint.

In running a test, workmen slid the pig inside the pipe until it straddled the joint with a rubber flange on each side of the weld. Inflating the flanges with the pig in this position sealed in the welded joint. Air was then pumped into the space between the flanges and pressure was exerted against the weld joint.

Prefabricated Bridges

Since the trench crosses street intersections at intervals of about every 100 yards or so, bridges were needed to carry cross traffic. The Slattery Construction Co. decided on the use of specially designed prefabricated portable steel units to save time.

The type of bridge used to carry foot traffic consisted of a large sheet of 1-inch mild-steel plate in which holes had been punched at the edges for ease in lifting and moving by means of slings and hooks. Each vehicle bridge was fabricated to size from 6 to 8-foot lengths of 6-inch I-beams beveled at the ends and welded to three plates of $\frac{1}{2}$ -inch steel—one piece on the flat and two narrow pieces for the beveled edges. Holes at the edges are made for easy lifting.

Portable Heater Is Made in Two Sizes

Two new portable heaters are announced by The Herman Nelson Corp. of Moline, Ill. One is an economy model designed to deliver up to 125,000 Btu's per hour; the other is a de luxe model said to deliver up to 250,000 Btu's per hour. Both units are electric-driven and use kerosene for fuel. They are recommended by the company for temporary and semi-permanent applications.

The economy model has an overall height of 41 $\frac{1}{2}$ inches, a length of 52 inches, width of 25 $\frac{1}{4}$ inches, and empty weight of 254 pounds. According to the manufacturer, the unit has a ventilating-air output of 800 cfm, a ventilating-air temperature rise of 144 degrees F, and a 12-inch x 12-foot collapsible canvas duct.

The de luxe model has an overall height of 50 inches, length of 56 $\frac{1}{4}$ inches, width of 31 $\frac{1}{4}$ inches, and empty weight of 375 pounds. According to the manufacturer, the unit has a ventilating-air output of 1,650 cfm, a ventilating-air temperature rise of 165 degrees F, and a 12-inch x 12-foot collapsible canvas duct. It is mounted on two rubber wheels to simplify moving.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 84.

Data on Tractor Winches

Specifications for its line of winches for use with crawler tractors have been compiled by Tulsa Winch, Division of Vickers, Inc., 823 E. First St., Tulsa, Okla. The Tulsa winches are made in a wide range of sizes for use with Allis-Chalmers, International Harvester, and

Caterpillar crawler tractors. They are divided into two general classifications—standard and high-speed.

The catalog lists the model number of the winch suitable for use with each model of tractor made by each of the three companies. It tabulates weight, number of forward speeds, line speed and pull for bare and full drums in each of the forward and reverse speeds, height from the ground, drum size, and drum cable capacity. It also tells whether the winch is free-spooling, and if it is reversible.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 71.

Core-Drilling Geologist

The Giles Drilling Corp. of New York City has added Girard Wheeler to its staff as Engineering Geologist. Dr. Wheeler formerly was Chief of the Subsurface Exploration Sections of the New York City Department of Public Works.



GET TWICE THE LIFE WITH
CAINE

CORR-PLATE

STEEL PILING!

New Caine Corr-Plate Steel can be ordered in a new steel alloy which gives it 100% greater corrosion resistance. This practically doubles the service life of your piling. Tests also prove this new alloy to be 25% stronger, giving you equal strength in a 25% lighter piling.

Caine Corr-Plate Steel Piling can be

used over and over again, thus distributing its cost over a great many jobs. It's nestable, easy to drive, and waterlight.

The world over, Caine Corr-Plate Steel Piling is being used for Foundations, Dams, Retaining Walls, Docks, Levees, Bulkheads, Sewers, Disposal Plants and hundreds of other jobs.



1. STANDARD



2. INTERLOCKING!

Now, More Than Ever Before...
STRONGEST Per Pound Weight!

2894

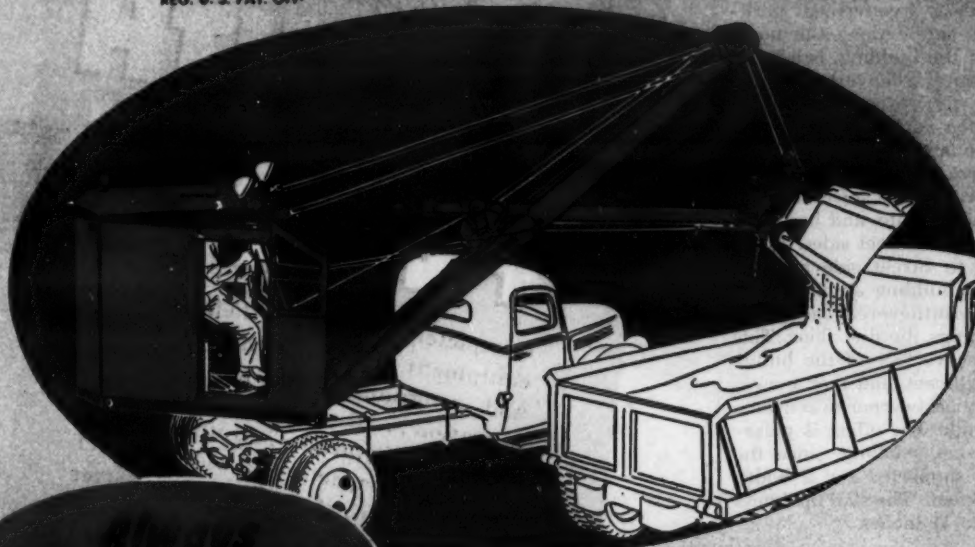
CAINE STEEL COMPANY

Steel Piling Division, 1820 N. Central Avenue, Chicago, Ill.



"QUICK-WAY" TRUCK SHOVELS

REG. U. S. PAT. OFF.



Always Dependable

Yes, "QUICK-WAYS" are dependable—and economical, quick and profitable to you. "QUICK-WAYS" accurate balance and strength with light weight permit higher travelling and working speeds, more yardage per day. Simplicity of design and quality steel construction give longer working life, lower operating and maintenance costs, lower initial cost and easier servicing. There's a "QUICK-WAY" owner near you, ask HIM.

Service available from our distributors strategically located throughout the United States and worldwide

Wherever a truck can go, and at truck speed, that's where you can take a "QUICK-WAY". Low center of gravity and proper balance does it.

Speed on the job moves more material per day at less cost—a "QUICK-WAY" gets around fast.

First in the field and still the leader, "QUICK-WAYS" have gotten around more and longer than any other truck mounted power shovel.

For speed, portability, economy of operation, and adaptability to a wider range of jobs, nothing of comparable size equals a "Quick-Way" Truck Shovel.

"QUICK-WAY"
TRUCK SHOVEL CO.
DENVER, COLORADO



Model E: 4/10 cu. yd. cap., for mounting on any standard 5-ton truck.
Model J: 1/4 cu. yd. cap., for mounting on any standard 1 $\frac{1}{2}$ -ton truck.

Cable Address: **Sengwayne, Milwaukee**

51 East 43rd St. New York 17, N. Y.	211 W. Wacker Drive Chicago 4, Ill.	715 Commercial Trust Bldg. Philadelphia 2, Pa.	233 Main Street Cambridge 42, Mass.	Seashell Bldg. Co. Milwaukee 3, Wis.	Alison Bldg. & Bldg. Co. San Francisco 4, Calif.
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Clyde Bldg. Co., Portland 3, Ore., & Seattle 4, Wash. • General Machinery Co., Spokane 1, Wash. • Brundage Machinery & Supply Co., Louisville 8, Ky.



first, second, and third floors are 15, 12½, and 12½ feet respectively.

The hoisting tower also served as the framework from which was fastened a Chicago boom for lifting materials to the different working levels.

Cantilevered Canopy

The cantilevered canopy around the south and east sides of the building projects 12 to 16 feet beyond the building line with a concrete slab 6 to 11 inches thick. The 6-inch thickness is at the tip of the slab. Back at the building line the 11-inch depth of slab is carried nearly 8 feet into the structure. The canopy extends out over the windows and doors of the ground floor and is only 4 feet 6 inches below the second-floor slab. It ties into this slab with a carrying beam in front which has a minimum thickness of 16 inches, and with a 10-inch kicker beam at the rear.

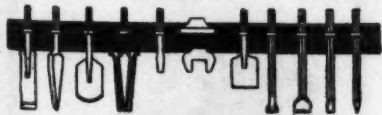
Below the canopy the entire first floor is faced with black granite, 4 inches thick, supplied by the Cold Spring Granite Co. of Cold Spring, Minn. The store is entered through glass doors on the Forsyth Street and parking-lot sides. Above the canopy are the buff brick walls, 12½ inches thick. This material was supplied by the Hydraulic Press Brick Co. of St. Louis.

In the brick walls there are only a few openings for windows to relieve the severity of the plain face, and larger openings for air intakes to serve the air-conditioning system. Around the sides of these openings project strips of Indiana limestone. Similar material is used on the roof coping, also with the same overhanging motif. The limestone slabs are flush with the inside of the brick walls, and overhang 12½ inches beyond the building line. The limestone is secured to the brick walls by ½ x 18-inch anchor bolts on 24-inch centers, passing through 8 x 6 x ¼-inch steel plates.

Modern Interior

Inside the store the concrete columns are covered with a ¾-inch coating of plaster. The walls are similarly lined, while partitions are constructed of metal lath and plaster 2 inches thick. On the first floor, some of the selling departments have been individualized with curving partitions. The beauty shop on the second floor has been similarly designed. With this exception, the second and third-floor selling space has been laid out in a rectangular pattern. There is no sales space in the basement.

"BICKNELL BETTER BUILT" PAVING BREAKER TOOLS



We manufacture a complete line of tools for pneumatic paving breakers, rock drills and diggers.

Write for descriptive circular

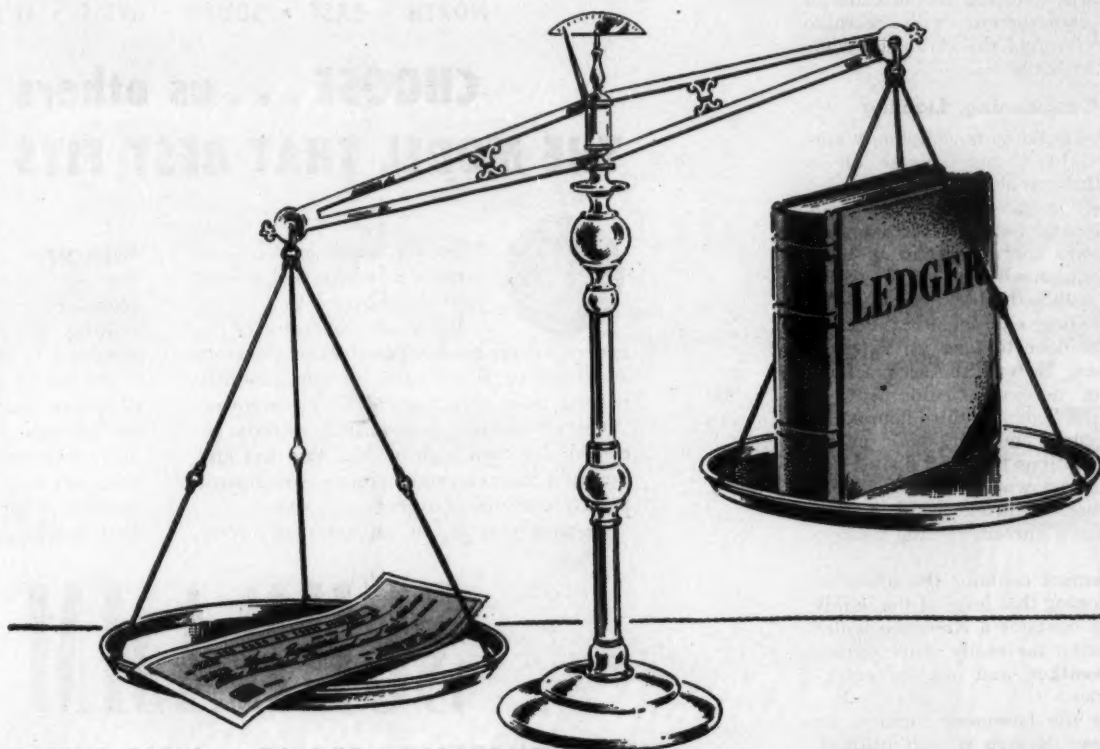
BICKNELL MANUFACTURING CO.
12 LIME STREET ROCKLAND, MAINE

Tennessee marble, white with a gray vein, was laid on the aisles of the first floor right after the concrete was poured. This method differed from the customary procedure of waiting until the rest of the work was done and then laying the marble, in order to prevent

At the bottom of the hoist tower (left) which handled materials during construction of the West End Store building, Zenolite for the roof slab is discharged to a ¾-yard skip from a Jaeger 2-yard truck-mixer on a Diamond T truck. On top of the roof (center) the Zenolite is chuted into concrete buggies and spread 4 inches thick over the slab. Above is a view of the store from the corner of Forsyth and Jackson Streets.

damage to it during the construction. By taking adequate precautions, however, the contractor safeguarded the

marble, and had the advantage of a finished floor to work from while trim-
(Continued on next page)



The Scales are Tipped in Your Favor

Instead of using working capital to purchase machinery and equipment, let C. I. T. furnish the money to complete the transaction. Conserve your own funds for operating purposes.

You can spread repayment over many months . . . gain the advantage of using modern machines . . . without tying up your capital. Increased earning capacity tips the scales in your favor . . . points the way to larger profits . . . smoother operations . . . more business.

You merely make a reasonable initial payment to the seller. Tell us what you want to buy, balance to be financed, how you want to pay for it. We handle the financing details for you or will work direct with your supplier.

Any of these offices will gladly furnish full information.

WEIGH THESE FACTS WHEN YOU PURCHASE MACHINERY AND EQUIPMENT

You can finance up to 75% of the purchase price.

Terms promptly arranged to suit your precise needs.

Several items can be financed simultaneously. One monthly payment covers all.

Cost is figured only on actual number of months required to repay advance.

WHEN YOU THINK
OF FINANCING
THINK OF

C.I.T. CORPORATION

NEW YORK CHICAGO ATLANTA SAN FRANCISCO LOS ANGELES

Modern Store Built In Big City Suburb

(Continued from preceding page)

ming up the interior. Protection to the floor was obtained by covering the 10 x 20 x 1-inch marble slabs with 1/4-inch paper board. The covering was stiffened and reinforced with 1/4 x 4-inch battens, nailed to the material on 4-foot centers. When this was removed later, the marble was given a thorough polishing.

Sales areas in the other parts of the store are carpeted. Behind the counters is finished concrete covered with asphalt tiles.

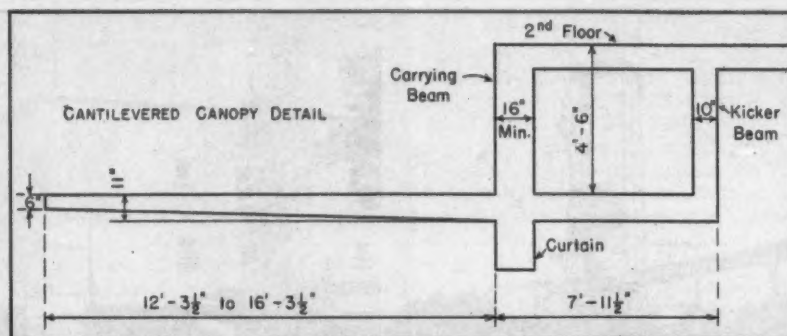
An Otis escalator system 4 feet wide operates between the first and third floors, and can accommodate 8,000 persons per hour. Two Otis elevators run from the basement to the top floor—an 8-foot 4-inch x 12-foot 4-inch freight elevator with a 5,000-pound capacity, and a passenger elevator of 3,500-pound capacity. Another shaft is built in the store for the installation of a second passenger elevator if necessary. There are also three enclosed sets of stairs of concrete construction with terrazzo surfacing. Around the stairs the walls are lined with tile.

Air-Conditioning, Lighting

The store building is completely air-conditioned by Carrier. Fresh air is drawn in through aluminum louvers set in the large openings left in the sides of the structure. Behind these openings are the rooms containing the air-conditioning equipment; the air ducts are contained within the hung ceilings. No air-conditioning equipment is located on the first floor to take up valuable selling space. Instead, the second floor houses the necessary equipment to serve the first floor; the third floor services the second; and equipment on the roof air-conditions the third floor. Also on the roof is a wooden cooling tower enclosed behind brick walls which, however, have louvers for the passage of air.

The basement contains the units for air-conditioning that level of the building. It also contains a Kewanee boiler for oil-heating the entire store during the cold weather, and one for emergency service.

Although the basement contains no selling space, its area is well utilized. It contains personnel offices, telephone



Above is a detail drawing of the cantilevered canopy which overhangs the first floor of Famous-Barr Co.'s new store in Clayton, Mo.

switchboard, class rooms for the instruction of sales girls, a kitchen with cafeteria for employees, and a huge stockroom. Also along the north wall are three important service rooms—one containing the air-conditioning and compressor equipment, another housing the boilers, and the third for electrical maintenance within the store.

Another feature in connection with

building maintenance are two large areaways opening into the basement along the north side. These openings, each 19 feet 2 inches x 6 feet 6 inches, permit equipment to be moved in and out of the store for replacement or repair without having to use any of the regular entrances.

Inside, the store is well lighted with four 30-inch-diameter circular lighting

fixtures recessed in the ceiling of each 20 x 24-foot bay. These Solar fixtures contain eight fluorescent tubes as well as one conventional electric light bulb. Each bay also contains one air-conditioning outlet similarly recessed in the ceiling. The store has an automatic sprinkler system with outlets in the ceiling.

Outside show windows for the store were constructed in an ingenious manner to conserve selling space on the important first floor. These windows, 12 feet wide and from 4 to 6 feet deep, had to be placed at different levels because of the profile grade of the streets and sidewalks. So instead of building them up from the ground floor, they were hung from the second floor by steel straps, 1/4 x 4-inch, placed on 6-foot centers. Robertson Q flooring was installed in the windows, and these light metal cells were covered over with a hardwood floor. The windows are serviced from a catwalk also hung from overhead. The space below the

(Concluded on next page)

NORTH • EAST • SOUTH • WEST • IT'S SCHRAMM!

CHOOSE... as others have — THE MODEL THAT BEST FITS YOUR NEEDS!



There's a Schramm Air Compressor, size and model, to meet your specific needs!

Below are listed nine of the many Schramm models, portables ranging from 20 to 420 cu. ft. of actual air, the stationary ranging from 2 to 600 cu. ft. displacement.

On all models performance records are evidence of their high quality. You will find the name Schramm written on every important page in compressor history.

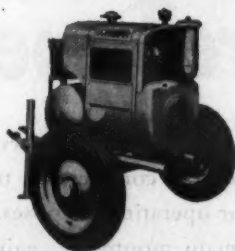
Features you get in Schramm are: 100%

water cooled, assuring ideal performance summer and winter; mechanical intake valve, forced feed lubrication, and electric-starter starting. All Schramms are compact, lightweight, easy to operate.

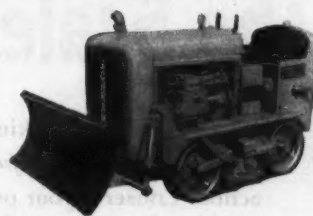
We invite you to write today for fully illustrated catalog describing in detail each of the Schramm Air Compressors shown here... plus a wide range of other models. We feel the Schramm story is a good one, and offers you a sure way to get your many compressed air jobs done quickly, efficiently, and economically.

SCHRAMM INC.

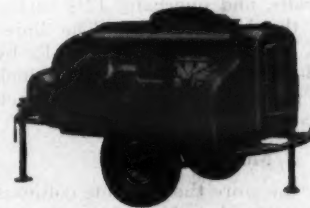
THE COMPRESSOR PEOPLE • WEST CHESTER • PENNSYLVANIA



20/35 Model Compressor



Self-propelled with Hydraulic Backfill Blade



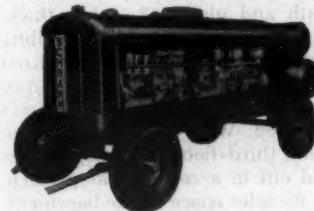
Two-Wheel Trailer Mounting with Tool Boxes



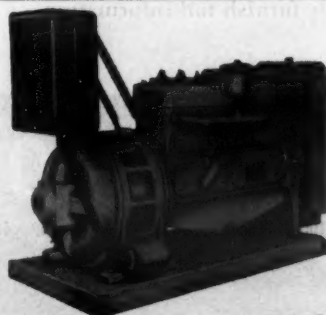
Skidded for Truck Mounting



Truck Mounted



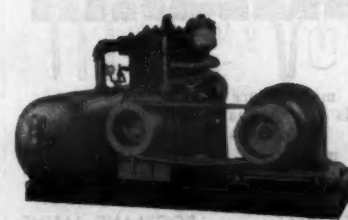
Diesel Engine Drive



Built-in Motor Drive with Cooling Unit and Starter



"V" Belt on Flat Pulley Drive



"V" Belt Drive with Air Receiver

Night Warning At All HAZARDS—BARRICADES



**Big
Beam
400-F
ELECTRIC
FLARE**

Night wrecks and accidents caused by hazards and barricades can be averted by warning lights and emergency flares. There are a thousand such uses for the Big Beam Electric Flare with red Fresnel lens. Dependable in any weather, set or hang anywhere in any position, knocking over will not interfere with its operation. A flip of the switch gives the choice of either a steady or a flashing flare. Interchangeable clear Fresnel lens converts it to a regular lantern. As easily serviced as a flashlight.

See your supplier, or write direct
U-C LITE MANUFACTURING CO.
1040 West Hubbard Street, Chicago 22, Illinois

show windows is thus available for selling.

Personnel

A force of around 200 was employed in the construction of Famous-Barr Co.'s West End Store in Clayton, Mo. The Westlake Construction Co., Glenn R. Reed, President, was represented on the project by L. A. White, Superintendent, and J. W. Flaig, Engineer.

The building was designed by Mauran-Russell, Crowel & Mullgardt, St. Louis Architects, and by Samuel A. Marx, Noel L. Flint, and Charles W. Schonne, Associate Architects from Chicago. John D. Falvey was Mechanical Engineer, and William C. E. Becker was Structural Engineer.

Torque-Converter, Fluid-Coupling Unit

A torque-converter and fluid-coupling unit for use with the Series 71 diesel engines is announced by the Detroit Diesel Engine Division of the General Motors Corp., 13400 W. Outer Drive, Detroit 28, Mich. According to the manufacturer, this unit will pick up loads with maximum lifting power, and will shift automatically from torque converter to fluid coupling in the higher speed ranges. It is available for use with the Single 3, Single 4, Single 6, Twin 4, and Twin 6 Series 71 engines with ratings from 75 to 300 hp.

The unit consists of four parts; the pump, turbine, and two stators. It will produce torque multiplications of 4 to 1, the manufacturer states. And because the flywheel is a working component of the torque-converter assembly, the complete integrated power plant occupies the same amount of space as a unit equipped with a conventional clutch and power take-off.

General Motors recommends the engine-torque converter unit for use in excavating and hoisting machines where high torque is required for digging and lifting operations. It points out that the unit automatically will build up the multiplied turning energy necessary for starting variable heavy loads of this type, and that it will provide an efficient transmission of power during light-load periods by changing over to the fluid coupling. The fluid circuit is said to prevent the engine from stalling under any load conditions, and to cushion the driven machinery and the engine from sudden shocks caused by heavy obstructions.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 95.

Personnel Changes at I. H.

W. M. Holland, former Central Regional Manager, has been appointed Assistant Sales Manager, Industrial Power Division, International Harvester Co. In addition, six Industrial Power Regional Managers have been recently appointed. They are: Jack Bess, Northwest Region; E. L. Boughton, Eastern Region; J. D. Gladden, Southern Region; R. H. Miller, Central Region; I. P. Payne, Southwest Region; and D. I. Persons, Western Region.



The model FDT-98W side-dump 20-ton-capacity Euclid which was displayed at the Road Show has recently been released for sale by Euclid distributors.

Side-Dump Trailer Has 20-Ton Capacity

A side-dump Euclid with a truck capacity of 13 cubic yards is now available from dealers of The Euclid Road Machinery Co., 1361 Chardon Road, Cleveland, Ohio. The trailer body is of heavy-welded construction and is designed for a payload capacity of 40,000 pounds. The Euclid tractor is powered

by a 200-hp diesel engine. Top speed of the unit when loaded is listed at 33.4 mph.

The down-folding side gates are opened automatically by a mechanical linkage when the body is raised by the Euclid hydraulic twin hoists. Either right or left-side dumping can be accomplished. Tires on the drive and trailer wheels are 24.00 x 25. According to the manufacturer, the Model

FDT-98W can dump its load non-stop over the bank or edge of a fill.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 120.

Impact Mixing of Asphalt

Special equipment which combines asphalt and aggregate for asphalt-paving mixes by a new method is described in a bulletin prepared by the Asphalt Processes Corp., 55 W. 42nd St., New York 17, N. Y. According to the manufacturer, this equipment atomizes liquefied asphalt through pressure nozzles so that it coats the aggregate with a thin film.

The folder features a cutaway drawing of the Impactor, showing how it works and illustrating the flow of material through it. The folder also describes the impact method of mixing materials.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 127.

"Speaking of truck shovels....."

Why did you buy a MICHIGAN?"

"Because I figured competition's bound to get tougher. I wanted a shovel that could cover lots of ground and make better money on all kinds of jobs. Take it from me, if you want to get the most for your money, get a MICHIGAN!"

"IT'S FAST ON THE ROAD—"

Gets to the job as fast as a truck, and under its own power.



"IT MOVES DIRT FAST—"

Anyway you look at it, it's yardage that counts. MICHIGAN'S 5.4 RPM swing and fast air clutches give you the extra yards a day you're after.



"IT'S REALLY BUILT—"

Any time you put a shovel on a truck you need a chassis that's designed for the job. And MICHIGAN knows how—they've built their own chassis for years.



"IT'S EASY TO HANDLE—"

You know that if a machine is rough on the operator he'll probably be rough on the machine. MICHIGAN'S air ram clutches are fast and easy. They take the work out of operating. That's why my operators like to run the MICHIGAN."



See MICHIGAN Truck Shovels at work on jobs like yours — write for Bulletin 100, "On The Job with MICHIGAN."

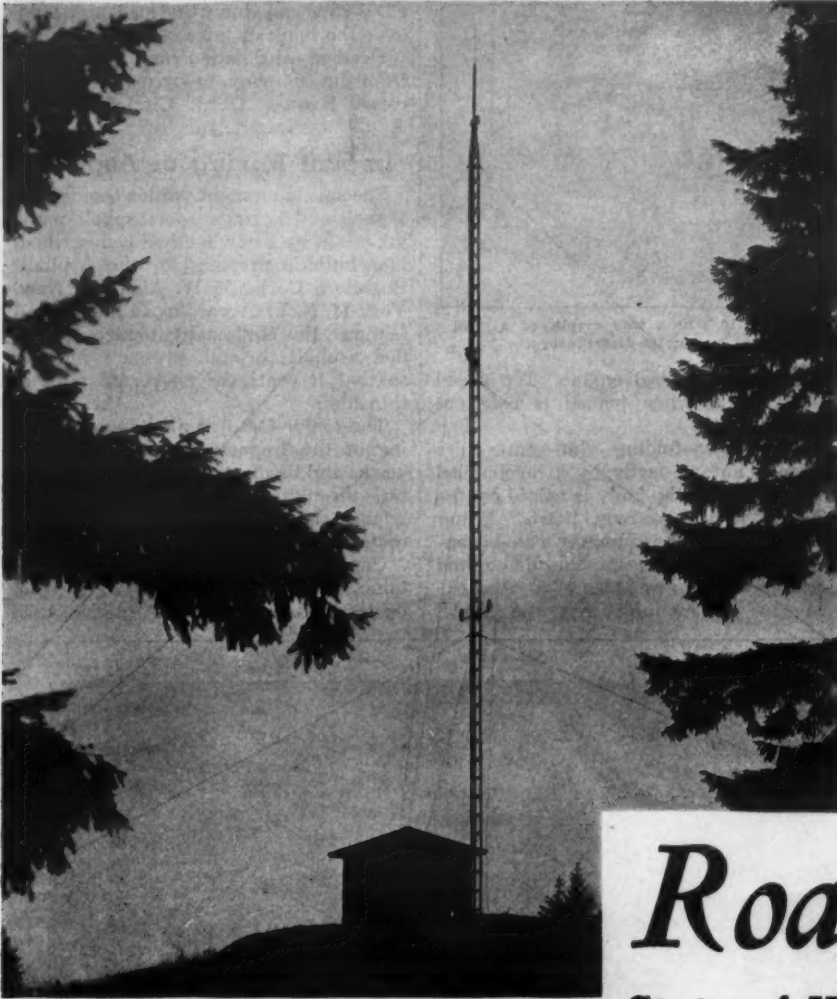
MICHIGAN

MICHIGAN POWER SHOVEL COMPANY, 500 Second Street, Benton Harbor, Michigan, U. S. A.

STERLING PUMPS

QUALITY
SIMPLE
DEPENDABLE
RUGGED
CHOICE OF
LEADING
CONTRACTORS
WRITE FOR
LITERATURE

STERLING MACHINERY CORPORATION
1405 Southwest Blvd., Kansas City



Center of the State of Washington's two-way radiotelephone communication system recently set up by the Department of Highways is the radio transmitter at Olympia, the state capital.

MAIN STATIONS

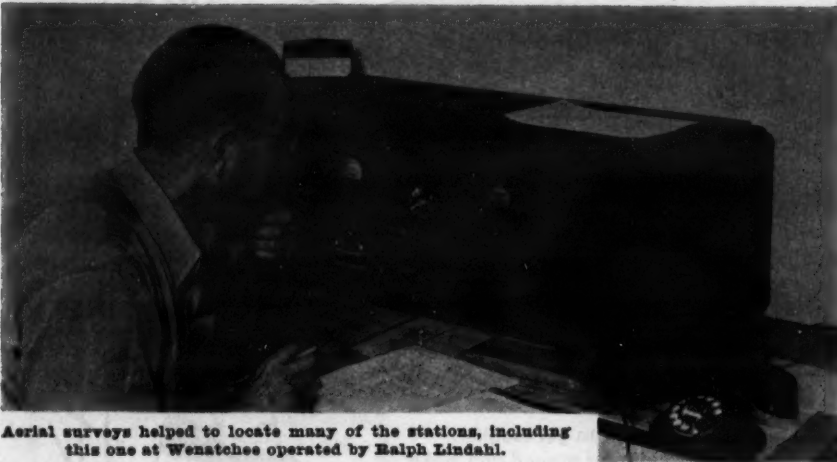


Motorola FM radiotelephone equipment is used in the headquarters station at Olympia, shown in this picture, and throughout most of the system.

Radio Speeds Road Maintenance

**State of Washington Installs Transmitter Stations
In Each District, and Mobile Two-Way
Radio Sets in Equipment**

(Washington Department of Highways Photos)
(See article on page 84)



Aerial surveys helped to locate many of the stations, including this one at Wenatchee operated by Ralph Lindahl.



Radio Engineer Clair Lewis was responsible for setting up the system for the Department of Highways, with the aid of a crew of five or six men.



In all, there are seven main stations in the state's six districts—this 250-watt transmitter is at Ellensburg.

MOBILE UNITS



Maintenance Engineer Richard Linton of Wenatchee can now radiotelephone his key men from a mobile unit in his car, keeping in touch with them even when he's on the move.



A maintenance supervisor like this chap on Blewett Pass can save time by calling in to report that asphalt mix is needed here pronto for patching a bad place in the road.

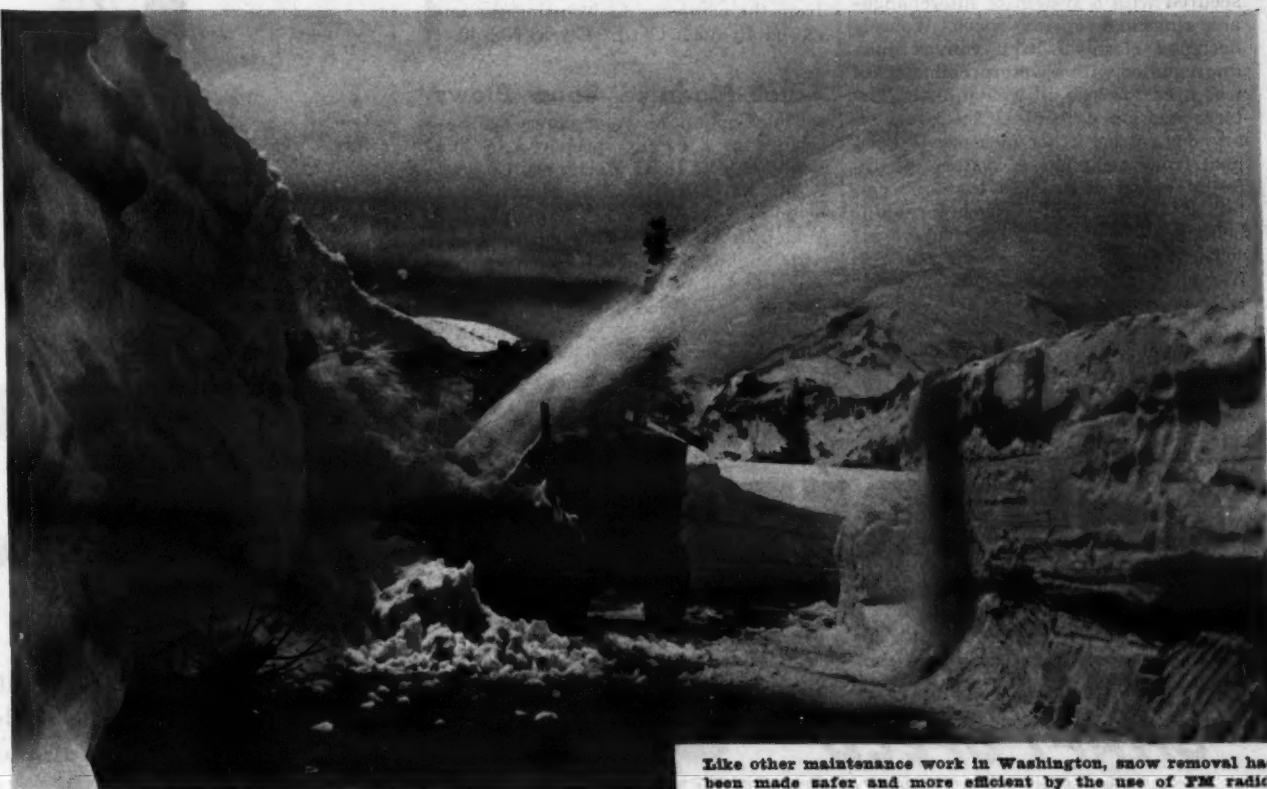
† THE Department of Highways of the State of Washington is now on the air at 37.98 megacycles. Speedier, safer highway maintenance is the result.

Despite mountainous terrain, seven main radio transmitter stations equipped with Motorola FM radiotelephones have been set up—one at Olympia and one in each of the state's six districts; so have repeater stations to relay messages, and division stations to give good local coverage in each district.

Moreover, about 135 of an ultimate 200 mobile two-way radiotelephone sets have been installed in maintenance trucks, in snow plows, and in passenger cars belonging to key department personnel.

In general, the main stations on 250 watts reach 150 miles, the division stations on 50 watts reach about 65 miles, and the mobile stations reach about 20 miles. Thanks to this statewide blanket, maintenance engineers, foremen, patrolmen, and equipment operators can keep in touch with one another as never before.

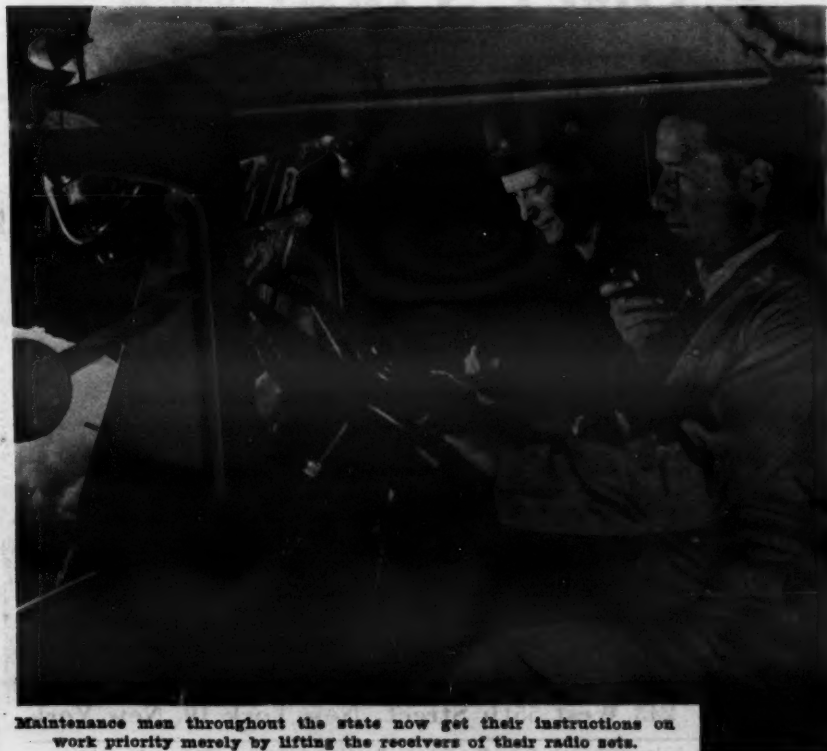
An enormously speeded maintenance job is one result. A much more efficient job is another result. And finally, this faster, better job is being accomplished with a saving in money and with an increase in highway safety for crews and motorists alike.



Like other maintenance work in Washington, snow removal has been made safer and more efficient by the use of FM radio.



From the cab of his plow, a Snowgo operator acknowledges orders to move to a new location where he is more needed.



Maintenance men throughout the state now get their instructions on work priority merely by lifting the receivers of their radio sets.

Tarpaulin Coverings For Winter Concrete

A specially designed tarpaulin cover to protect freshly poured concrete in temperatures of 50 degrees or less has been designed by the H. Wenzel Tent & Duck Co., 1037 Paul St., St. Louis 4, Mo., for the Chain of Rocks lock job, where concrete is being poured at below-freezing temperatures. The tarpaulin was furnished by Lowe-Machinery Co., Chicago, one of Wenzel's Illinois distributors.

Concrete for Lock 27 on the Mississippi River near Granite City, Ill., is poured in 200 monoliths measuring 40 x 50 feet and from 6 to 10 feet high. Steam was decided upon as the method of heating the freshly poured concrete, but the problem was to hold in this heat. The complexity of the lock design, with its stepped monoliths, eliminated the possibility of merely draping tarpaulins over the fresh concrete. This would have meant too much moving and replacing of canvas and too much loss of steam.

Accordingly, frameworks were built over each monolith. These were covered with weather-tight tarpaulins manufactured by Wenzel. The tarps were secured with a system of interchangeable rings and ropes. A special Wenzel-designed closely woven canvas duck impregnated with a waterproofing agent was used to close all weave holes. The tarps overlap each other by 3 feet on all edges as a further measure to keep heat from escaping. A system of different colors is used so that one can tell at a glance where each tarpaulin belongs.

The tarpaulins were secured to the frames in such a manner that a crane was able to lift the entire unit without



U. S. Army Corps of Engineers Photo

To protect concrete poured in temperatures below freezing at Lock 27, Granite City, Ill., frameworks are built over each monolith and covered with Wenzel tarpaulins to hold in the steam heat.

removing any of the canvas. Men and materials can enter the tarpaulin huts without removing any of the canvas, since the sides roll up and down like window shades. The huts are said to maintain heat at 50 degrees and above for the first 5 days after pouring, and above freezing for 9 more days after the forms are removed.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 46.

Truck-Mounted Snow Plows

Truck-mounted snow plows are described in a catalog prepared by the New England Road Machinery Co., 801 E. 6th St., South Boston, Mass. Items listed in Bulletin No. SP-12 include the Model R-34L reversible-blade plow with an automatic blade trip, for use with 1 to 3-ton trucks; the Model R-37H with flare plate and apron, for use with

2 to 5-ton trucks; the Model TP adjustable V-plow for use with 2½ to 5-ton trucks; the Model TPS adjustable V-plow for 1 to 3-ton trucks; the Models

RT-49 and RT-48 Nermco one-way plows for light-duty use.

The catalog illustrates each of these snow plows and lists complete specifications covering length and height of moldboard; type of mounting, control, and blade release; lifting height of plow mechanism; approximate weight; and size of trucks for which each plow is recommended.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 67.

New NCPMI Director

Neal R. Fosseen, President of the Washington Brick, Lime & Sewer Pipe Co. of Spokane, Wash., has been selected to represent the Pacific coast region on the Board of Directors of National Clay Pipe Manufacturers, Inc. He replaces A. C. Gladding of San Jose, Calif. Roy Lacy, President of the Pacific Clay Products Co., will continue as the other Director of NCPMI for the region.

You Can Always Count on Briggs & Stratton

- To improve still further and make even better the world's finest 4-cycle, single-cylinder, air-cooled gasoline engines.
- To maintain and even raise the high standards set for materials, workmanship, methods, and precision production.
- To expand and still further improve the world-wide organization of factory approved service stations.
- To continue to be accepted as "preferred power" everywhere for industrial, construction, railroad, and farm equipment.

BRIGGS & STRATTON CORPORATION
Milwaukee 1, Wisconsin, U. S. A.



15,000 V. P. M. IN CONCRETE

with
**FLEXIBLE
SHAFT SPEED**

OF ONLY 3,600 R. P. M.

This amazing step-up in frequency of the vibrator head is made possible by a patented, non-eccentric rotor device found only in Vibro-Plus "Rollgear" vibrators.

50% higher frequency guaranteed—Low speed flexible shaft

- save as much as a bag of cement per cu. yd.
- concrete of uniform strength and density
- less mechanical wear and tear
- longer unit life

No time is lost for periodic stripping down. The flexible shaft can be lubricated in less than 20 seconds. *The Vibrator Head Runs Dry.* No clamping or screwing needed at the power source.

"Rollgear" is designed and built for long, uninterrupted work periods.

ELECTRIC GASOLINE PNEUMATIC



VIBRO-PLUS CORPORATION

Internal and External Vibrating Equipment

243 West 55th Street, New York 19, New York

Interested dealers may contact our Mr. Eric Fridh at Stevens Hotel, Chicago, Jan. 16-20.

Portrait in Print

By BILL QUIRK

Contractor Finds That Six Sons Are Answer to Supervisory Needs

† D. R. SMALLEY, a Celina, Ohio, contractor, has been blissfully immune to one of the chief shortages felt by the construction industry—the lack of trained supervisory personnel. A hint of how he solves that sometimes vexing problem is found in the name of his organization, D. R. Smalley & Sons, Inc. The latter half of the title stands for six intelligent, sturdy, energetic, young men ranging in age from 23 to 38 who carry on the firm's business with the cheerful enthusiasm of one big happy family—which they are. Carry on, of course, under the wise guidance and careful direction of the elder Smalley, who has behind him over a quarter century of experience in the contracting business.

The father-and-sons combination has been functioning a comparatively short time under its present company name, the incorporation itself dating only from January, 1946. But before that, Smalley Senior had been training his boys in construction practice from the time they first came of working age, for he had been a partner in a contracting firm since 1920. Prior to that, his time had been spent in the rather divergent fields of engineering and country-school teaching. The teaching experience probably accounts for the thorough way he has imparted his practical knowledge of construction to his six boys.

Born on a Farm

Dillon R. Smalley was born in November, 1886, on a farm in the north-west corner of Mercer County, Ohio, of which Celina, his present home, is the county seat. After attending high school in near-by Rockford, he enrolled in Lima Lutheran College, Lima, Ohio. He left college after two years, and became a country-school teacher in a sparsely settled region not far from where he was born and raised. When he was 21, the youthful teacher married Pearl Hinton, a farmer's daughter whom he had met while attending a church meeting.

Then as now, the salary of a rural pedagogue was notoriously meager, so when a vacancy arose in the Mercer County Engineer's office, young Smalley forsook the teaching profession for engineering. He settled in Celina, and has resided there ever since. A natural aptitude for mathematics was an advantage in this new line of work, and the ex-teacher took readily to surveying and the practical common-sense type of engineering required in rural county road work.

He learned how to build satisfactory low-cost roads and drainage structures, and soon became Deputy County Engineer. After six years in that capacity he ran for the post of County Engineer; that office was up for election since the former county engineer had retired. Smalley was elected and served a four-year term.

Becomes Contractor

By this time the Smalley family was increasing, and the salary of a county official was far from adequate to cope with such realities as the cost of children's shoes and growing appetites.

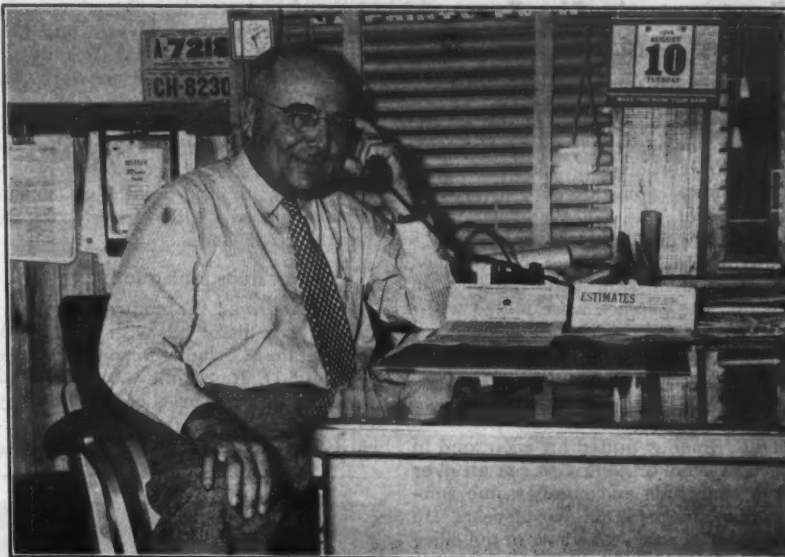
"The five-dollar-a-day salary of 1920 was too scanty for my needs", D. R. Smalley reflected, "and I felt that I could earn more as a contractor than as a county engineer. I went into partnership with N. L. Hinton, my wife's cousin, who was also a former county engineer. Our first contract was a concrete-paving job 1.7 miles long in Mercer County for

the Ohio State Department of Highways.

"As I look back to those early days, our methods seem mighty primitive. We had an early-model 2-bag paver mounted on wheels that we rolled along over planks. The paver was a coal-burning steam rig. Plenty of water was required, not only for the paver and the concrete, but also for curing. Slabs had to be kept wet for 21 days, so we usually laid pipe lines the length of the job.

"After building up the grade we hauled out the aggregate and stockpiled it at frequent intervals. This was gen-

(Continued on next page)



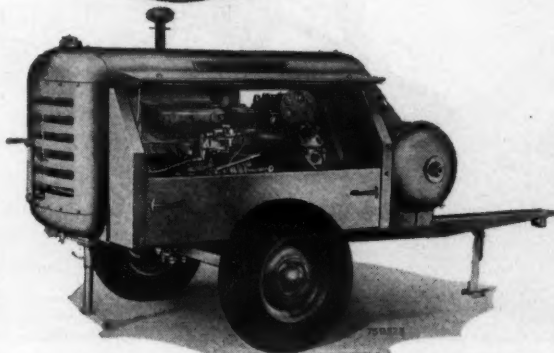
C. & E. M. Photo

No wonder contractor D. R. Smalley has a cheery twinkle in his eyes—no shortage of trained supervisory personnel for him, with six sons in D. R. Smalley & Sons, Inc.

the FINEST COMPRESSOR you can buy in a PORTABLE



two-stage air-cooled



stays new... stays efficient

Fifteen years of continuous development and refinement in design and manufacturing methods have been put into this compressor since Ingersoll-Rand originated the first Two-Stage Air-Cooled portable... the machine that changed the whole trend in portable compressor design.

This fine, rugged compressor is just one of the many cost-saving features in Ingersoll-Rand's new KA-Series MOBIL-AIR.

- ① **DIVIDED HEADS** minimize heat transfer from discharge to intake air... cooler valves, longer life, higher efficiency.
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 - ⑤ **TIMKEN TAPERED-ROLLER MAIN BEARINGS** provide anti-friction and permanent alignment.
 - ⑥ **CONSTANT-LEVEL LUBRICATION** is simple, non-clogging, dependable.
 - ⑦ **FINNED OIL RESERVOIR** helps maintain low oil temperature.
- * **TWO-STAGE COMPRESSION** is 15% more efficient than single-stage... lowers discharge temperature, avoids carbonization... maintains nearly full capacity at altitude.
- ** **COMPLETE AIR-COOLING** eliminates all water joints... simplifies construction, saves weight... compressor cooling system is independent of engine.

331-2

DON'T STOP WITH A GOOD COMPRESSOR!
Use the **CONTRACTORS' COMBINATION**

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- Top quality machines that work as a team.
- Machines designed, built, sold and serviced by men who know rock excavation... application "know how".

Ingersoll-Rand

Contractor's Six Sons Join Him in Company

(Continued from preceding page)

erally done by teams of horses and wagons. The paver was set up alongside a stockpile—between the forms, of course, for it would tip over if not kept nearly level. The aggregate was shoveled into wheelbarrows, along with a little dirt too, I guess, and then dumped into the paver skip with the bags of cement. The batches were mixed without benefit of water control, timing devices, or air entrainment, and were then chuted out onto the grade."

Bull Work

D. R. Smalley puffed his cigar, and in the blue smoke seemed to see all over again the crude and cumbersome construction methods of yesteryear. He relaxed his heavy-set frame in the office swivel chair, and his hazel eyes twinkled under bushy black eyebrows. A smile of reminiscence hovered at his mouth for an instant, and then was gone. He smoothed down the few remaining gray hairs at the sides of his head and continued:

"Finishing operations were all done by hand, without the aid of any machines or equipment. Puddlers wearing rubber boots spread the concrete around with shovels. Then it was struck off level with the top of the forms by a heavy screed, pushed and pulled by several men on each side. Yet those old pavements stood up well. The first one we built lasted for nearly twenty years. I know, for we also got the contract to reconstruct it about ten years ago.

"Of course those early roads were narrow, only 14 to 16 feet wide, but we didn't have any truck traffic to speak of then. Another big difference between then and now was in the pavement cross sections. The early jobs we built had a 6-8-6-inch pavement with the extra thickness in the center. That was to satisfy the usual middle-of-the-road traffic, I guess, since that was the way most cars were driven. Drivers would pull over to the side only to pass another car, which was not very often, then go back to the center again. Now, the average road section around here is either of uniform thickness, or with more depth at the edges for heavy truck loads.

"Labor was cheap and plentiful then too. Road workers were paid 35 cents an hour for a 60-hour week. Things have certainly changed, and in not too long a time either. Why, it seems only yesterday I was out there on the job with the old steam paver.

"But many of our present roads are of obsolete construction, much too narrow for safety. The berms [an Ohio term for shoulders] are likewise too narrow, the side ditches too deep, and the curves too sharp. These factors account for many of the automobile accidents in this country. This type of road served its purpose in the horse-and-buggy days, but is dangerous in this age of high-speed motor travel."

Airport Construction

Hinton & Smalley confined their contracting activities chiefly to highway work in Ohio and Indiana. But their last job as a partnership, and also their biggest, was paving the concrete runways at Wright Field, Ohio, for the U. S. Army Air Technical Service Command. Most of the Army's experimental and technical work is carried on at that airport.

"We got our first contract at Wright Field in June, 1941, and we never got out of the place until the war was over", Smalley related. "We did about \$1,000,000 worth of construction behind those fences, including some 300,000 square yards of concrete pavement on runways, taxiways, and parking aprons. There was no shutting down of work because of the winter. We poured concrete in all

kinds of bad weather. Speed was the keynote; get the runways in and help win the war, we were told. Despite the rush and the out-of-season work, the paving is still holding up well."

D. R. Smalley is modestly proud of his part in the war effort, but the war also brought a great personal sorrow to the family in the death of a son, Richard, who was killed while flying for the Army Air Corps.

Reorganization

After the war the contracting partnership was dissolved, with the Hinton Construction Co. being formed from one half, and D. R. Smalley & Sons, Inc., from the other. Three of the Smalley sons had returned from service—Edward from the Army, Mark and Luke

from the Navy. And with the other three—George, Francis, and John—the senior Smalley was not in want of able assistants. The equipment from the partnership was equally divided, and the Smalleys bought more machines to handle the jobs for which they had successfully bid.

Their first ventures were earth-moving projects consisting of large-scale stripping operations for aggregate producers and cement companies. Then an important highway job came their way—two contracts in fact: one from Indiana and the other from Ohio on U. S. 40, running from one state to the other. The work was grading, and paving with concrete a dual highway 3 miles long on new location. It totaled around \$781,000.

At present the company is engaged on two other Ohio highway contracts. One is a \$298,000 job on State Route 73 near Oxford; it consists of a mile of grading, drainage, and black-top, including a bridge. The other is a short 1,800-foot stretch of similar road construction including curb and gutter through the town of Piqua on U. S. 36. The Smalleys are set up to handle grading and concrete work, but usually have other contractors do the black-top and bridge work.

The company might be considered a typical contractor engaged primarily on road work. It owns equipment with a book value of around \$250,000. For earth-moving it has 4 self-propelled rubber-tired scrapers, 4 crawler trac-

(Concluded on next page)

Built to



No motor grader without All-Wheel Drive and All-Wheel Steer can hope to equal the all-around operating efficiency of an Austin-Western "88-H," "99-H" or Master "99."

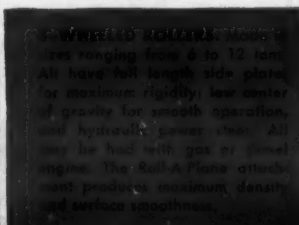
There are no idling front wheels; all weight is on drive wheels contributing 100% traction. All-Wheel Steer provides unequalled maneuverability; saves time on every job.



BADGER CONVERTIBLE SHOVEL. 3/4-swing design eliminates tail swing; makes it possible to use the Badger in close quarters; reduces swinging weight and definitely increases work output. The Badger can be converted into a Crane, Dragline, Pile Driver, Trench Hoe, or Skimmer. Wheel mounts provide fast, easy job-to-job portability. A cab is available on special order.



MODEL "40" MOTOR SWEEPER. Fast, maneuverable, and economical in operation. No troublesome expensive conveyor or elevator to keep in adjustment and repair—dirt is thrown directly into the 2-yard hopper. Can be equipped with either right-hand or left-hand gutter broom or both. Leaf Broom attachment simplifies the collection of heavy accumulations of leaves.



TANDEM ROLLERS. Models in line ranging from 4 to 12 tons. All have full length side plates or maximum rigidity; low center of gravity for smooth operation, and hydraulic steering. All can be had with gas or diesel engine. The Roll-A-Plane attachment produces maximum density and surface smoothness.



TANDEM ROLLERS. Versatile, rugged, and economical. Models in line ranging from 4 to 12 tons. All have full length side plates or maximum rigidity; low center of gravity for smooth operation, and hydraulic steering. All can be had with gas or diesel engine. The Roll-A-Plane attachment produces maximum density and surface smoothness.



tor and scraper units, 3 shovels of $\frac{3}{4}$ -yard capacity, and 6 trucks. To handle a concrete-paving job there are these units: a 34-E dual-drum paver, mechanical spreader, finishing machine, aggregate and cement bins, and 4,000 feet of steel road forms.

Smalley Boys

It is in supervisory personnel that the Smalleys are unique and not typical.

"I started with a girl and stopped with a girl," Smalley remarked with a quiet chuckle, "but in between there are now six boys. George and Francis, 38 and 34 respectively, both studied engineering at Purdue University and are my superintendents. Ed, who is 28, and Luke, 23, are foremen."

The Smalley office in Celina also is

the headquarters for the Builders Supply Co. and the Ready Mix Concrete Co., both going concerns that are Smalley-owned and operated. Son John, 29, looks after the Builders Supply Co. which has been serving Celina and vicinity for the past twelve years. It has six on the payroll.

The Ready Mix Concrete Co. is a later venture, having been organized only this past April on a modest scale. But it is already placing about 1,100 cubic yards of concrete a month with four truck-mixers and a force of seven employees. From the batch plant, on the north side of Celina, the truck-mixers serve an area within a 15-mile radius, filling a long-felt need for the delivery of mixed concrete in the community. The concrete business is supervised by

son Mark Smalley, 26, who graduated from Miami University at Oxford, Ohio, with a degree in business administration.

Not to forget the distaff side of the Smalleys, the youngest, Patricia, now 20, is a sophomore at Miami University, and the only unmarried child. Catherine, the oldest at 40, is married to a farmer and lives on the 280-acre Smalley farm 10 miles out of Celina.

The farm is Smalley's only hobby. It is primarily a dairy farm, for the corn, oats, wheat, and soy beans that are grown there are used chiefly to feed his 45 head of milk-producing Holstein cattle.

Mr. and Mrs. Smalley live in Celina not far from the office that serves as headquarters for the Smalley enter-

prises. In one corner of the private office occupied by D. R. Smalley is a rack holding sets of plans for current jobs. On the walls are several pictures of his boys, singly and in groups with their father. Tucked in the available space remaining are certificates of membership in the National Associated General Contractors and in Ohio and Indiana state chapters.

The Smalley enterprises are not limited to construction, however. According to the latest census, D. R. Smalley has twenty-one grandchildren and one great grandchild. That should insure future superintendents and foremen to the veteran contractor for several more generations.

Shores, Clamps, Forms, Etc.

A catalog on a line of steel forms for concrete work has been put out by Acrow, Inc., 155 Washington St., Newark, N. J. This 16-page bulletin also describes the Acrow line of shoring and other construction devices. Among the items it lists are adjustable steel wall forms, road forms, column clamps, Acrow steel shores, trench jacks, Acrow steel floor centers, and miscellaneous accessories.

The catalog illustrates each of these units and lists the uses to which it is suited. Tabulated data cover the sizes in which the units are supplied, weights, and list numbers. Among the special shapes of Acrow Ferroforms listed in the bulletin are stop-end plates, corner angles, splay corner pieces, and Ferroforms with bolt holes for use with bolts as an alternative to clamping.

A second catalog illustrates a full use of tubular scaffolding and fittings.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 122.

Listing of Diesel Engines

Detailed specifications on every commercially manufactured American diesel engine have been compiled by Department CE of Benjamin's for Motors, 2124 Mill Ave., Brooklyn 10, N. Y. This 32-page catalog is designed to serve as a guide for users of diesel-powered equipment. It groups the engines according to manufacturers, listing each company's complete line.

Each model number is followed by detailed specifications on the number of cycles, continuous horsepower rating, number of cylinders, bore, stroke, displacement, continuous rpm, fuel system, method of starting, dimensions, weight, etc. Any specific information about a particular model, make, or style of engine is also included.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 125.

Maintenance of Bearings

Maintenance procedures for anti-friction bearings are discussed in a 20-page bulletin put out by The Tyson Bearing Corp., Massillon, Ohio. The bulletin describes the several types of anti-friction bearings and lists the uses to which each type is best suited. Cut-away drawings illustrate and label the various parts of both ball and roller bearings.

The bulletin lists a dozen don'ts and a dozen do's to remember when working with bearings. It describes several ways in which bearings can be damaged, and tells what to do in order to avoid accidental damage to the bearing surfaces. It illustrates and describes tools for handling bearings, and the proper use of these tools. And it contains miscellaneous information on assembly, storage, fits and adjustments, and lubrication of bearings.

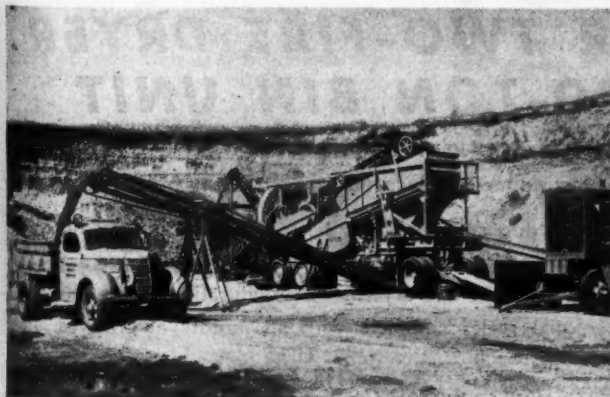
Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 90.

OUTPERFORM



All-Wheel Drive and All-Wheel Steer make it easy for an Austin-Western Power Grader to do a superlative job of bank sloping. The operator can do all normal ditching and

grading; then high-lift the blade to any desired bank cutting position—including the vertical—without leaving the platform. No other grader can do it.



PORTABLE CRUSHING PLANTS. Built in sizes and types to fit every production requirement. Equipped with matching Crushers, Screens and Conveyors, correctly balanced to deliver the maximum amount of crushed and screened aggregate in controlled sizes. From the smallest plant to the magnificent "101" pictured above, every Austin-Western Portable Plant is engineered for low-cost tonnage.



STATIONARY CRUSHING PLANTS. This limestone plant with its two Jaw Crushers and Roll Reduction Crusher is typical of the efficiency of design that characterizes every Austin-Western plant. Two men control the entire operation; one at the Primary Breaker, the other to make the rounds of the matching Crushers, Screens and Conveyors. Each Austin-Western plant is tailor-made for its job.

AUSTIN-WESTERN COMPANY • AURORA, ILLINOIS, U. S. A.

BUILDERS OF ROAD MACHINERY
Austin Western



The Duo-Fast tacking tool is designed for fastening facing and protective materials to forms. It can be operated with one hand.

Form-Lining Tacker

An automatic tacking tool for use by construction companies is manufactured by the Fastener Corp., 866 W. Fletcher St., Chicago 14, Ill. The Duo-Fast hand-gun tacker is recommended by the company for fastening facings and protective materials such as Hydron to forms, and for other similar operations.

The Duo-Fast tacker uses a $\frac{3}{8}$ -inch staple and features one-hand operation. It is said to provide a fast and easy method of tacking, and is designed to serve a large number of needs on heavy-construction projects such as dams, spillways, and so forth.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 93.

Steam-Cleaning Gun

A new gun for use with steam-cleaning equipment is announced by Oakite Products, Inc., 172 Thames St., New York 6, N. Y. The Model 481 gun is designed to develop sufficient vacuum to discharge cleaning solutions to a height of over 12 feet. A special feature claimed for the new unit is its ease of handling.

The gun has an overall length of 5 feet and is so balanced that it can be used over extended periods of time without tiring the operator, the company explains. It has two spade-type insulated handles, situated so that each of the operator's hands supports the same weight. The forward handle remains stationary while the rear handle is rotated to change the direction of the nozzle. Steam and solution lines are connected to the gun by swivel joints to keep them from twisting when the gun is rotated. A rubber-apron backing is a special safety feature designed to protect the operator from the steam valves, and other hot fittings.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 85.

Features of Excavator

A 16-page catalog on the construction and operation of the $\frac{3}{4}$ -yard Model 83 excavator unit has been prepared by The Byers Machine Co. of Ravenna, Ohio. The catalog features a description of how the various parts operate to provide for the smooth functioning of the machine. Photographs and text show how the Model 83 swings, how it travels, how it steers, and how it can perform any of these operations during hoisting intervals.

Catalog 748 emphasizes the compactness of the main deck, how the upper deck is arranged so as to provide direct drive for all operations, and how the lower deck is designed to simplify travel and steering operations. The catalog also shows the grouping of the operating controls, and describes the worm-driven boom hoist, chain-crowd shovel attachment, the improved clutches, the heavy-duty dipper, the tapered hook rollers for taking strains on the upper deck, the crawler treads. Photographs show the machine in use as a dragline, shovel, and trench hoe.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 114.

Truck Spreader Unit For Sand, Salt, Etc.

A truck-mounted sand spreader for ice and snow control is distributed by the Charles N. Wood Co., 570 Arsenal St., Watertown, Mass. The Humphrey spreader is designed for use with sand, cinders, salt, calcium chloride, or mixtures of such materials. The unit is power-operated and is designed to throw to any desired width regardless of truck speed. The spreading width can be varied and is one-man-operated by the driver of the truck from the operator's cab.

Features of the Humphrey unit are the agitator and two paddle shafts which feed the sand to the spreader at the rear of the truck. An oscillating paddle throws the sand right and left across the road to the desired width. The spreader's hopper body has a capacity of 10 tons.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 63.

Calcium Chloride's Use In Concrete Discussed

The effect of calcium chloride in portland-cement concrete mixes is described in a 40-page booklet prepared by the Solvay Sales Division, Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y. This semi-technical manual contains information gathered from the latest available research and technical papers and reports on the subject.

The Solvay booklet discusses the effects of varying temperature and cold weather on special-type cements including air-entraining, high-early-strength, and low-heat cements. The data are illustrated by tables, graphs, and charts which cover such subjects as setting time, early strength, curing, slump, density, surface wear, shrinkage, and ultimate strength.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 77.

Line of V-Belt Sheaves

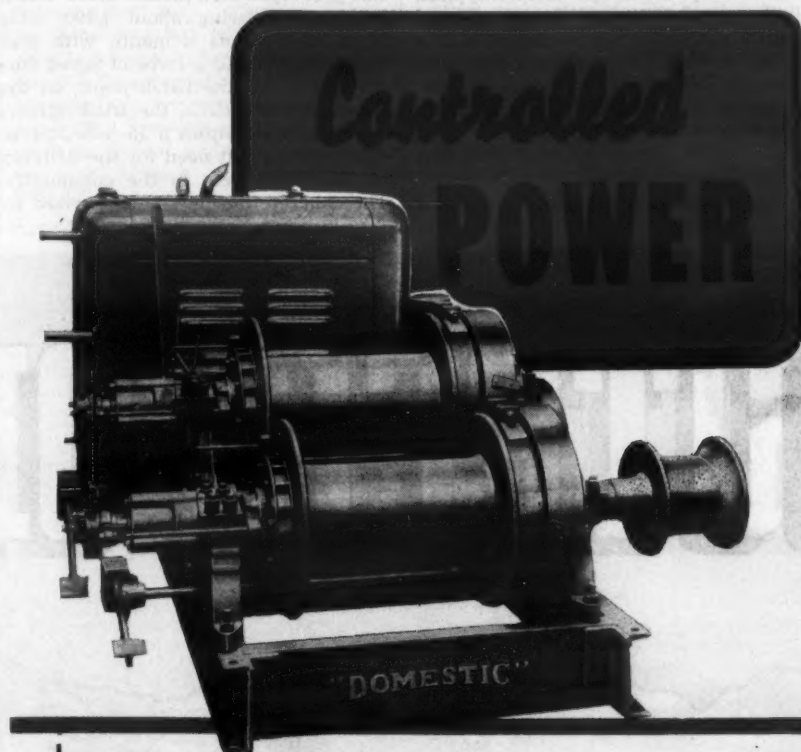
A line of V-belt sheaves designed to meet a wide variety of construction uses is described in a catalog issued by the American Gear & Mfg. Co., 5900 Ogden Ave., Chicago 50, Ill. The White Line stock sheaves are made with interchangeable hubs and bushings; the

standard models are made to order for applications which require exacting specifications.

Catalog No. 419 describes the construction and features of the White Line sheaves and gives general information on ordering. It is divided into two main sections, one dealing with the

standard sheaves and the other with the stock models. Tables provide information on pitch diameters, number of grooves, dimensions, weights, prices, etc.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 128.



There's a wide range of power in the capacity of DOMESTIC hoists—from 800 to 6000 lbs., single line pull. But there's one thing all DOMESTIC hoists have in common. They're built for the "long pull" with all the engineering skill that our 44 years of manufacturing "Know-How" can contribute. If your job calls for a hoist, you'll do better by choosing a DOMESTIC. Write Dept. C for FREE catalog.

DOMESTIC ENGINE & PUMP COMPANY

A Division of Empire Industries, Inc.

SHIPPENSBURG • PENNSYLVANIA

CUMMER ASPHALT PLANTS

COMPLETE PLANTS
FROM 60 TO 100 TONS
PER HOUR
FURNISHED AS
ILLUSTRATED

Other Smaller Plants Portable
Mounted on Pneumatics

PROMPT SHIPMENT
ON ALL SIZES
FEEDERS—STORAGE BINS—
PUMPS—TIMERS
AND OTHER UNITS AS
REQUIRED

Literature Upon Request

CUMMER TWO-FIRE DRYER and 40-TON BIN UNIT

PHOTO BELOW SHOWS TYPICAL INSTALLATION

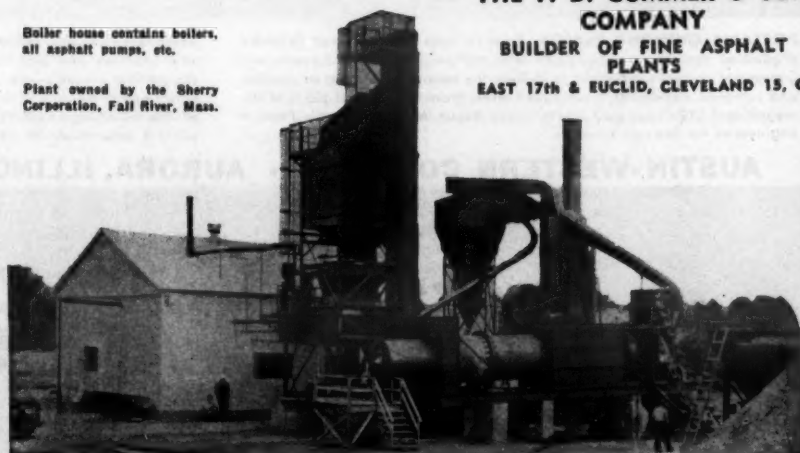
60 tons per hour capacity—located at Fall River, Mass.

Completely equipped with dust collection unit discharging into boot of hot elevator. Plant is equipped with 3-compartment cold storage hopper and feeder for regulation of feed into the dryer. 4' x 10' vibrating screen, 40-ton bin, 1-ton mixer, dial scales complete with all motors and drives.

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Concrete-Pile Bents Support New Bridge

Steel I-Beam Spans With Concrete Deck on 592-Foot Structure; Bascule Span Rests on Solid Pier

ON State Highway 105, or Heckscher Drive, in Duval County in north-east Florida, a new bridge has been constructed over Cedar Creek. The State Road Department of Florida awarded a contract for the job to the Okeechobee Construction Co. of Jacksonville, Fla., on its low bid of \$339,837.78. Work on the ½-mile bridge project, which included approaches, started on December 26, 1947, and was scheduled for completion by the end of 1948.

Located just west of Eastport, the new bridge consists of sixteen steel I-beam spans with concrete deck, and a single-leaf bascule span supported on a concrete pier. The bascule span is 50 feet, while the others are approximately 32 feet, for a total length of 592 feet.

Beginning at the west end, the bents, including the end bents, were numbered from 1 to 17. The concrete pier between bents 3 and 4 is 35 feet 2 inches long and was not numbered. It spans a 50-foot channel to rest bent 4. The pile-bent superstructure is designed for H15-44 loading and has a 28-foot roadway, while the single-leaf trunnion-type bascule is designed for H-20 loading. The minimum horizontal clearance at the bascule span is 40 feet, with an 11-foot vertical clearance when the span is closed.

Old Structure

The contractor started work on the new bridge project as soon as the county forces put a road, paralleling on the north, in shape to serve as a detour. Then he began removing the old timber structure, which was about 700 feet long with an 18-foot roadway. There was more to this structure than met the eye. Constructed around 1921 as part of the Heckscher Drive toll road, the wooden trestle was actually built on top of an old lumber dam. This structure dammed up the creek to form a log pond for the Foley Lumber Co., and served as a skidway and gantry in handling the logs.

Around 40 years old, the old dam consisted of two walls tied together with 2-inch iron rods and filled with earth and rock to form a durable structure. The old untreated piles were still in excellent shape when they were pulled out, many still retaining the original bark of the trees from which they were fashioned. A lift gate was built into one end of the structure for boats to pass through. Using jets, a crane, and snatch block, the contractor pulled over 3,000 piles before he started work on the new bridge which occupies approximately the same line as the old dam and timber trestle.

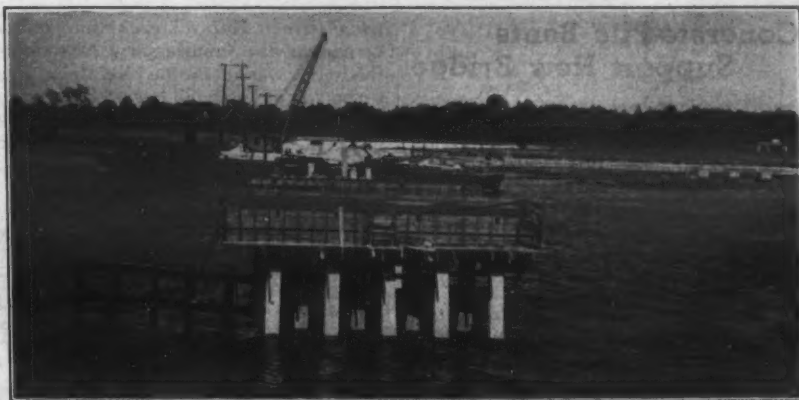
Most of the piles were pulled from a floating rig which later served as a driving barge for the long concrete piles in the new bridge. This wooden barge measured 165 x 35 x 12 feet deep, giving a 450-ton flotation. It was secured in position with large 10-yard chunks of concrete buried in the soft muddy bottom of the creek to serve as anchors. A Koehring 604 crane with a 60-foot boom was used to pull the piles from their place in the old structure.

Concrete Piles for New Bridge

While the timber dam and trestle were being removed, the contractor was also driving test piles for the new bridge, constructing the approach fills, and casting reinforced-concrete piles in a yard on the west side of Cedar Creek.

Material for the embankments came from borrow pits on each side of the creek, requiring hauls averaging a mile. The pits yielded sand which was dug out by a Bucyrus-Erie dragline equipped with a 1-yard bucket. The contractor's own fleet of twelve 6 x 6 GMC 5-yard dump trucks hauled the sand to the fills where it was spread by Caterpillar tractor-dozers—a D6 and an RD7. An International TD-18 dozer worked in the borrow pits with the dragline. To get good compaction, the fill was water-tamped as it was placed, using water pumped out of the creek by a Jaeger 4-inch centrifugal pump.

Wooden forms for casting the piles were built in the yard on the west side of the project. They consisted of panels made from 1¼-inch lumber braced with



C. & E. M. Photo

In the foreground of this view looking east across Cedar Creek is the rest bent for the bascule span of the new bridge Okeechobee Construction Co. built. It has nine battered piles, five on one side and four on the other.

a 2 x 4 rib every 18 inches. Most of the other form work on the job was done on shore, whenever possible, where a CMC table saw helped speed the operation. The average 18-inch square concrete pile with tapered tip is 55 feet

long and weighs 9 tons. Concrete was mixed in two ½-yard mixers—either a Jaeger or a Rex.

Both Lehigh and Penn Dixie bag cement were used on the job. They were (Continued on next page)

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Concrete-Pile Bents Support New Bridge

(Continued from preceding page)

shipped by rail from Birmingham, Ala., to a siding of the Atlantic Coast Line one mile west of the bridge. To this rail point also came the aggregate for the concrete—sand from the Diamond Interlachen Sand Co. of Interlachen, Fla., and gravel from the Roquemore Gravel & Slag Co. of Montgomery, Ala. The aggregate was unloaded at the siding by a Byers crane with a 40-foot boom and a ½-yard clamshell bucket. The dump trucks hauled the material to the west side of the bridge where it was stockpiled. Reinforcing steel was supplied by the Virginia Steel Co. from its Birmingham, Ala., plant.

Being near the ocean, the brackish water of Cedar Creek could not, of course, be used for the concrete, but a fresh-water well was available on shore. The old lumber company formerly operating at this location had sunk an 8-inch well to a 900-foot depth. When a 2-inch reducer was put on this free-flowing source, water was piped through 2-inch lines to every part of the job with excellent pressure.

In the concreting operations the batches were weighed in wheelbarrows on a Winslow beam scale. Mall vibrators were employed as the concrete was placed in the forms. Curing was done with burlap and water.

Typical Batch

A typical 2-bag batch of concrete had the following dry weights:

Cement	185 lbs.
Sand	302 lbs.
Gravel	574 lbs.

Water was added at the rate of 5.3 gallons to the bag of cement.

Pile Driving

A typical bent consists of four concrete piles on 8-foot 8-inch centers, with the two inner piles plumb and the two outer piles battered 1½ inches to the foot. The end bents contain nine piles, while bent 4, the rest bent for the bascule span, also has nine battered piles, five on one side and four on the other. Design load for the piling is 37 tons.

To drive the piles as easily and quickly as possible, the contractor's Superintendent D. V. Kindell built a short set of steel leads or halter, only 20 feet long, from I-beams and angle irons. At the bottom was a 4-foot steel hood which slipped on over the top of the pile, and above that was the framework containing the Vulcan No. 1 single-acting steam hammer. At the top of the framework were three holes by which it was picked up with a single line from the crane and placed on the pile. The center pick-up hole was used when driving plumb piles. Two other holes in the top framework member were offset for use when driving piles with a batter of either 1½ or 2 inches to the foot.

Much time was saved in picking up and laying down long leads by using this short halter, and the pile-driving crew consisted of only 7 instead of the

usual 10 men. Hazardous climbing of the boom was also unnecessary. As soon as the halter was set on the pile, steam was turned on and driving began. Piles were driven with the 60-foot boom crane working out from the big barge as far as 35 feet from the rig. Only 20 minutes

of maneuvering were required to pick up the hammer-and-halter combination and set it on top of the pile. On an average, two piles an hour were driven in this way after the piling had been placed.

The piles were first set with jets, us-

ing a 2-inch line on two sides of the pile. Water for the jet lines was pumped from the river by a Chrysler-driven 2,200-gpm jet pump. No jetting was employed, however, when driving started. Piles were driven from the west end of

(Continued on next page)

SEAMAN Pulvi-Mixer Builds a More Durable... More Stable... Macadam Base!



Mixing-in fines with crushed rock at Orchard Field Airport, Chicago, Ill. to eliminate stratification and segregation of aggregate.

The Seaman leaves a surface layer of fines ready for immediate compaction. Note smooth surface left by roller which immediately followed the previous pass of the Seaman.



Mixing fine slag and 4" crushed slag to form a durable, stable base ready for immediate compaction on this Pennsylvania road. Tough going in 4" slag but the Seaman is built for heavy-duty service. Selective speed transmission adapts rotor speed to job requirements.

SEND FOR THIS FREE BOOKLET "Macadam Base Construction Methods" contains the latest information, descriptions, methods and procedures for Macadam base construction. Ask for Bulletin No. 60.

Modern Macadam is Pulvi-Mixed

A road is no better than its base. That is why more and more modern Macadam base roads are being built with Seaman Pulvi-Mixers . . . to assure uniform depth and blend of the aggregate, prevent the segregation and stratification of materials, and provide a more stable, more durable base. The Seaman Pulvi-Mixer leaves a thoroughly blended, homogeneous texture ready for immediate compaction.

Where fines are employed as binder, the Seaman disperses them thoroughly, from top to bottom, filling the voids and assuring a more positive keying and locking of the aggregate. At the same time it leaves sufficient fines, level with the surface, for smooth rolling and compaction. It also saves hundreds of man hours per mile by eliminating the slow, costly "hand brushing-in" of the fines.

Seaman Pulvi-Mixers are equally effective in the mixing-in-place of crushed stone, slag, chats, gravel, etc., with water, tar, asphalt, Portland cement or other binders. No matter what your job may be, a Seaman will provide a better mix for longer-lasting, low-cost road construction.

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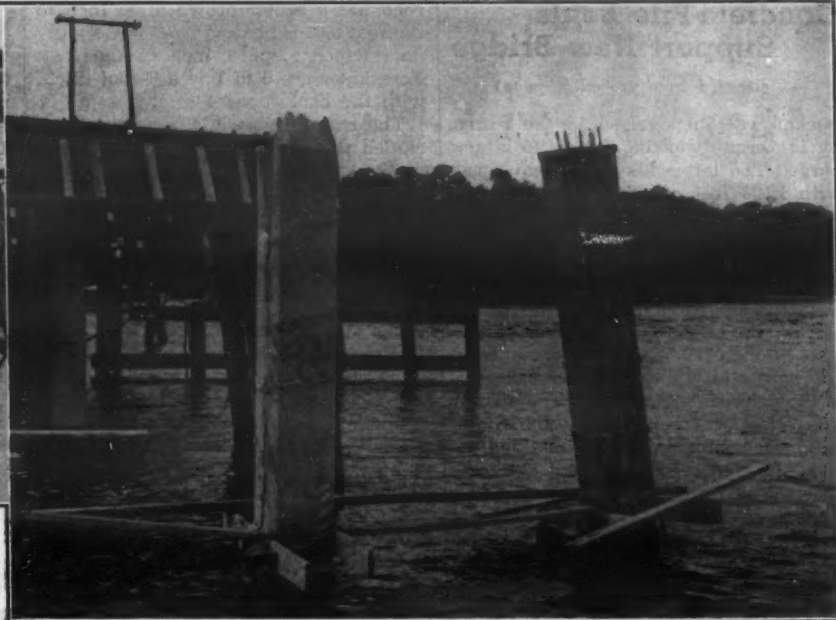
SELLING USED EQUIPMENT?

See pages
110 and 111

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C. & E. M. Photos
Superintendent D. V. Kindell (above) stands beside the short pile leads he built for Oksechobee Construction Co.'s bridge project in Duval County, Fla. This 20-foot-long halter saved a good deal of time, and a 7-man crew drove the precast concrete piles instead of the usual 10 men. In the other photo are two newly poured piles which had to be built up. On the one at the right, the steel form is still in place.



the bridge to the east so that capping could begin soon after the first bents were driven. Steam for the hammer came from a 60-hp vertical boiler which burned wood. An ample fuel supply was available from the dismantled original timber structure.

Built-Up Piles

An unusual feature of the job was that only a few cut-offs of the concrete piling were required. On the other hand, 27 build-ups were necessary. These were mainly located on the east half of the bridge where easy driving was encountered in soft blue gumbo and muck. On the west side of the creek the piles were driven into a fine water-bearing sand. The depth of water in the creek ranged from 6 to 22 feet, the greater dimension being at the channel.

Special steel panel forms with interlocking joints were used in extending or building up the already driven piles. These special forms, in two sections, were made in the contractor's shop at Jacksonville, Fla., of $\frac{3}{8}$ -inch steel plate bent into the shape of a channel 18 inches deep and with 9-inch sides. They were made up in two lengths of 8 and 10 feet so as to cover enough of the pile below the top to insure good line on the extension. The maximum length of build-up was $8\frac{1}{2}$ feet. The two forms making up the complete panel section were bolted together with $2\frac{1}{2}$ x $\frac{1}{2}$ -inch bolts, on 2-foot centers along both sides.

The forms were filled with concrete which was mixed on a 60 x 28 x 8-foot-deep wooden barge. Stockpiles of aggregate were heaped at one end of the barge along with bags of cement. One of the 2-bag mixers was aboard, as well as a 300-amp electric welder for welding additional steel to the reinforcing rods in the piles. The welding was generally done from an 18 x 20-foot pontoon float. This float was somewhat higher out of the water than the mixing barge. Thus after the concrete was mixed and discharged into wheelbarrows, the latter were run up on the pontoon float so that the material was easily shoveled out by hand into the forms.

Caps and Deck

When the pile work was completed on a bent, two 4 x 10's were bolted along the sides to support the cap forms by friction. Across these members were placed 3 x 8's on 22-inch centers to hold up the floor of the cap. Both bottom and side cap forms were made of $1\frac{1}{4}$ -inch stock. Along the sides were 2 x 4 studs on 14-inch centers with a double 2 x 4 wale near the top. The caps are 32 feet long, 4 feet wide, and 3 feet deep, with the piles projecting into them 15 inches.

Concrete for the caps was also mixed on the barge and usually discharged into a $\frac{1}{2}$ -yard concrete bucket. The

(Concluded on next page)



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*Heating and ventilating system and rear corner windows with de luxe equipment optional at extra cost.



CHOOSE CHEVROLET TRUCKS FOR TRANSPORTATION UNLIMITED

Concrete-Pile Bents Support New Bridge

(Continued from preceding page)

bucket was then raised to the forms by the crane working from the larger barge. The latter barge was equipped with 1,100 feet of cable attached to a 3-drum winch aboard so that it was easily maneuvered from one bent to another. The smaller mixer barge was pulled around by a hand line running from the shore out to a pile bent.

After the caps were constructed, five steel 24-inch WF 74-pound beams were laid across on 6½-foot centers as part of the deck superstructure. The structural steel was supplied by the State Road Department, which obtained it from the Federal government. Otherwise the project might have been delayed considerably by the contractor's inability to obtain this scarce item. The contractor picked up the steel at near-by Fernandina and hauled it to the job site on a GMC 50-ton transport trailer. It was unloaded by a Mack truck equipped with a tripod and winch at the rear. Steel for the bents adjoining the shore was set by the crane on land. Farther out, the steel was placed by the crane on the barge.

The steel was then used to support the wooden deck forms for the 7-inch concrete slab on the 28-foot roadway. The forms were made up in 10-foot sections on the barge and then raised in place. Hook anchors were hung from the steel beams on 2-foot centers. Scabs from 2 x 6's were set on the flanges of the beams and brought to grade with wedges from the bottom. These uprights were on 12-inch centers. When a deck pour was completed and the concrete cured with burlap and water, the forms were removed after 14 days by dropping them down to the barge below. They were then moved to the next span to be poured.

Bascule Span

In constructing the pier for the bascule span, a cofferdam 38 feet 2 inches long x 32 feet 9 inches wide and 37 feet deep was required. It was made of 50-foot lengths of steel sheet piling driven with a drop hammer. Interior bracing consisted of 12 x 12 wales with 10 x 10-inch cross struts. After excavating the interior, the contractor drove 120 untreated-timber piles on 3-foot centers as a foundation for the pier. These piles are 30 feet long with 6-inch tips and 12-inch butts, and were driven by a 4,000-pound drop hammer swung from a crane on the barge.

The piles extend through a 9½-foot seal 12 inches into the footing. The bottom of the seal is at elevation minus-32. The footing is 5 feet thick and is set back 9 inches from the outside of the seal. An underwater tremie, handled by a crane on the barge, was used in pouring the seal concrete. The outside of the pier shaft is 27 feet 11 inches x 35 feet 2 inches wide, measured across the bridge, with walls 4½ feet thick. Top elevation of the pier is 17.75.

Form work for the bascule pier consisted of 1¼-inch lumber with 2 x 4 studs on 14-inch centers, and double 2 x 4 wales on 4-foot centers, with wire ties every 3 to 4 feet. Concrete was mixed on the deck of the adjoining span, and either chuted over to the pier form or handled by a bucket from the crane on a barge below.

The steel for the single-leaf bascule span was furnished by the contractor and erected by the Nashville Bridge Co. of Nashville, Tenn. The deck of this span is 5-inch I-Beam-Lok flooring.

Quantities and Personnel

Included in the contract was the pavement for the approaches which consists of an Ocala-rock single 6-inch base course, 20 feet wide. This was given an RT-3 tar prime, followed by a bituminous surface treatment. The

road has a center crown of ¼ inch to the foot and is flanked by 8-foot shoulders which slope 1 inch to the foot. Foreslopes are 6 to 1 to a 3-foot ditch, with the backslopes 4 to 1.

The major items in the contract included the following:

Excavation	34,700 cu. yds.
Ocala-rock base, single 6-inch course	6,030 sq. yds.
RT-3 tar prime	1,500 gals.
Bituminous surface-treatment material	3,620 gals.
Concrete	1,802 cu. yds.
Reinforcing steel	147,210 lbs.
Structural-steel bascule span	135,300 lbs.
Treated-timber piles	5,600 lin. ft.
Precast-concrete piles, 18-inch	4,600 lin. ft.

The Okeechobee Construction Co. of Jacksonville, Fla., employed a force averaging 35 men on the bridge construction under the direction of D. V. Kindell, Superintendent.

For the Florida State Road Department, M. W. Cressler was Resident Engineer. John R. Slade is Division Engineer of Division 2, in which the project is located, with headquarters at Lake City. E. C. DeGarmo is State Highway Engineer of the Department, with offices in Tallahassee.

Oscar B. Coblentz Dies

Oscar B. Coblentz died recently at the age of 70. Mr. Coblentz was Chairman of the Board of the McLean Contracting Co. He served as President of The Associated General Contractors of

America, Inc., during 1943, and from 1928 to 1934 he was Vice President of the Merritt-Chapman & Scott Corp. A unique combination of lawyer, educator, and contractor, he was widely known in construction for his work to improve conditions in the industry.



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Convention Calendar

Jan. 16-20—AED Meeting

Annual meeting, Associated Equipment Distributors, Stevens Hotel, Chicago, Ill. Frank G. Knight, Executive Secretary, 360 N. Michigan Ave., Chicago 1, Ill.

Jan. 19-21—ASCE Meeting

Annual meeting, American Society of Civil Engineers, Commodore Hotel, New York City, N. Y. Don P. Reynolds, Assistant to the Secretary, 33 W. 39th St., New York 18, N. Y.

Jan. 24-26—Ohio Highway Conference

Sponsored jointly by Department of Civil Engineering of The Ohio State University, and the Ohio Department of Highways. Professor Emmett H. Karer, Chairman, Conference Committee, Brown Hall, The Ohio State University, Columbus 10, Ohio.

Feb. 7-9—ARBA Meeting

Annual meeting, American Road Builders' Association, Mayflower, Statler, and Willard Hotels, Washington, D.C. Charles M. Upham, Engineer-Director, International Bldg., Washington 4, D. C.

Feb. 13-15—Carolina Road Builders

Annual meeting, Carolina Road Builders Association, Ocean Forest Hotel, Myrtle Beach, S. C. Carolina Road Builders Association, P. O. Box 2826, Raleigh, N. C.

Feb. 23-25—American Concrete Institute

Annual convention, American Concrete Institute, Hotel Statler, New York City, N. Y. Harvey Whipple, Secretary-Treasurer, American Concrete Institute, New Center Bldg., Detroit 2, Mich.

Feb. 28-March 2—Utah Highway Conference

Annual meeting, Highway Engineering Conference, Union Bldg., University of Utah, Salt Lake City, Utah. Prof. A. Diefendorf, Head of the Civil Engineering Department, University of Utah.

Feb. 28-March 3—AGC Convention

Annual convention, Associated General Contractors of America, Inc., Waldorf-Astoria Hotel, New York, N. Y. H. E. Foreman, Managing Director, Munsey Bldg., Washington 4, D. C.

Feb. 28-March 4—ASTM Meeting

Spring meeting and Committee Week, American Society for Testing Materials, Edgewater Beach Hotel, Chicago, Ill. C. L. Warwick, Executive Secretary, 1916 Race St., Philadelphia 3, Pa.

March 1-3—No. Atlantic Highway Officials

Annual convention, Association of Highway Officials of North Atlantic States, Hotel Statler, Boston, Mass. A. Lee Grover, Secretary, State Highway Department, Trenton, N. J.

March 10-12—Mississippi Valley Meeting

Annual meeting, Mississippi Valley Conference of State Highway Departments, Edgewater Beach Hotel, Chicago, Ill. C. E. Vogelgesang, Chief Engineer, Indiana State Highway Department, Indianapolis, Ind., Conference Secretary.

March 23-26—Roadside Development

Eighth Annual Short Course on Roadside Development, Auditorium of Ohio Department of State Bldg., 65 S. Front St., Columbus, Ohio. Dallas D. Dupre, Jr., Landscape Architect, Department of Highways, Columbus 15, Ohio.

April 11-14—Purdue Road School

Annual Road School, Memorial Union Bldg., Purdue University, Lafayette, Ind., and Road Show in Purdue Armory. Ben H. Petty Professor of Highway Engineering, School of Civil Engineering and Engineering Mechanics, Purdue University.

Engineering Data Sheets On Hard-Facing Procedures

Engineering data sheets on hard-facing procedures are prepared by the Wall Colmonoy Corp., 19345 John R St., Detroit 3, Mich. Two new data sheets just released deal with the hard-facing of mixer arms on concrete and cinder-block equipment, and on hard-facing of tire chains. The data sheets are enclosed in a folder for ease in filing in a standard file.

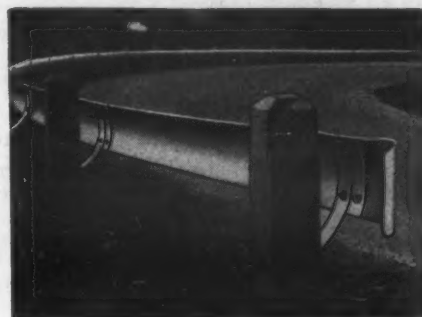
The Wall Colmonoy sheets describe the general purpose of each process, and point out the economy of each. The sheets then list the equipment needed and explain the process step by step. Sketches clarify the discussion. The data sheets also list material costs.

Copies of this literature may be ob-

tained from the company. Or use the enclosed Request Card. For the data sheet on the hard-facing of mixer blades, circle No. 81; for hard-facing of tire chains, circle No. 82.

Asphalt Institute Officers

The Board of Directors of the Asphalt Institute has announced the list of officers for 1949. N. H. Angell is President and Chairman of the Executive Committee, which includes A. M. Maxwell, Sidney Goldin, D. H. Jenks, Jr., E. E. Scholer, O. D. Bridges, and W. L. Spencer. Mr. Goldin is Vice President in charge of Division I, the Atlantic-Gulf; Mr. Jenks, Division II, Ohio-Great Lakes; Mr. Scholer, Division III, Midwest; Mr. Bridges, Division IV, Southwest; and Mr. Spencer, Division V, Pacific Coast. Bernard E. Gray was re-elected General Manager-Chief Engineer. Herbert Spencer is Secretary of the Institute; George R. Christie, Treasurer; and John N. Smith, Assistant Treasurer.



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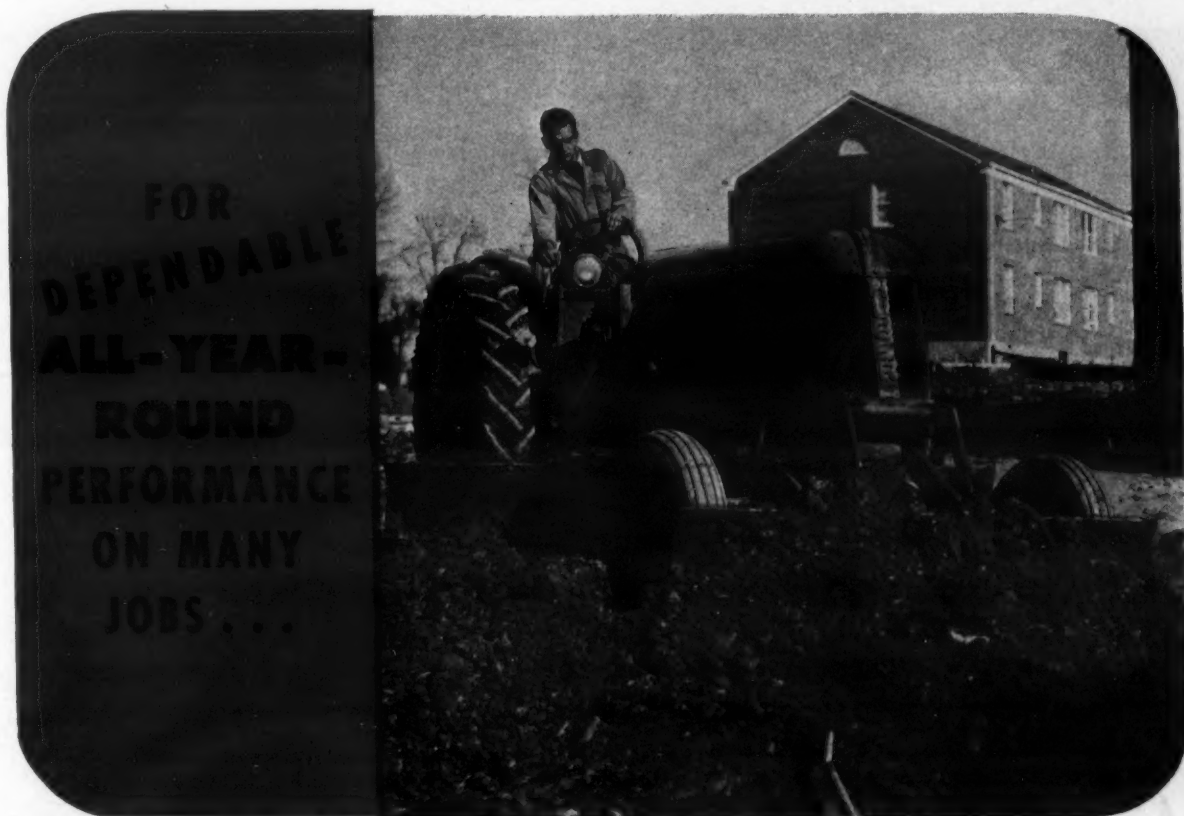


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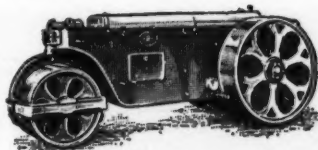
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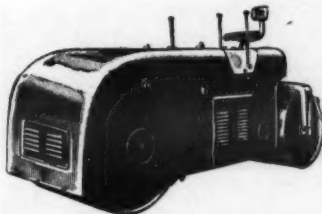


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JOBS . . .

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HUBER 3-WHEEL ROLLERS
4 models — 4 to 12 Tons



HUBER TANDEM ROLLERS
5 models — 3 to 14 Tons



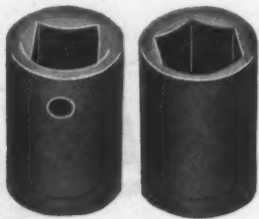
THE HUBER MFG. COMPANY
Marion, Ohio, U.S.A.

Lick your year-round maintenance problems with the Huber Maintainer. It's a versatile and dependable machine—built to handle every phase of highway, road, street, and airport maintenance at savings to you! The Huber Maintainer with its hydraulically operated auxiliary units is readily adaptable for service as a bulldozer, patch roller, lift loader, snow plow, rotary broom or berm leveler. Ask any experienced operator about the Maintainer! He'll speak well of Huber's advanced design... rugged "engineered" construction... rigid material specification... and other manufacturing skills that add up to dollar savings and longer years of trouble-free service for you.

Remember, too, that Huber's complete line of road machinery—3-wheel rollers... tandem rollers... trench rollers has for years been a standard in the construction field. See a Huber before you buy any road machinery. Write today for descriptive bulletins and name of dealer nearest you.

HUBER

3 Wheel • Tandem
ROAD ROLLERS
and
MAINTAINERS



The new Owatonna Series PS sockets for use with impact wrenches and designed especially for long service life. They come in 13 sizes.

New Impact Sockets

New sockets for use with impact wrenches have been introduced by the Owatonna Tool Co., 348 Cedar St., Owatonna, Minn. These forged power sockets are designed to have a long service life and to stand up against hard usage. The OTC Series PS sockets have comparatively thin walls and hexagonal openings. They are for tools with a 1/2-inch-square drive, and they

are made in thirteen sizes ranging from 7/16-inch to 1 1/4-inch openings.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 89.

Concrete-Testing Machine

Cement and concrete-testing machines are illustrated and described in a 4-page bulletin released by The Baldwin Locomotive Works, Testing Equipment Department, Philadelphia 42, Pa. Catalog No. 287 covers the 90,000-pound-capacity Baldwin-Emerly tester and the 300,000-pound Baldwin unit.

The bulletin describes the two machines and lists the uses of each. It describes their construction and operation, and explains the loading system, weighing system, and indicating system. It also tells about other machines manufactured by Baldwin for use in cement and concrete testing.

Specifications of the 90,000 and the 300,000-pound units listed in the bulletin cover the high and low ranges,

the dial divisions, stroke, maximum opening, maximum testing speed, height, floor space required, and weight. The bulletin also lists the sizes and shapes of samples which the machines will handle.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 110.

Crawler-Tractor Details

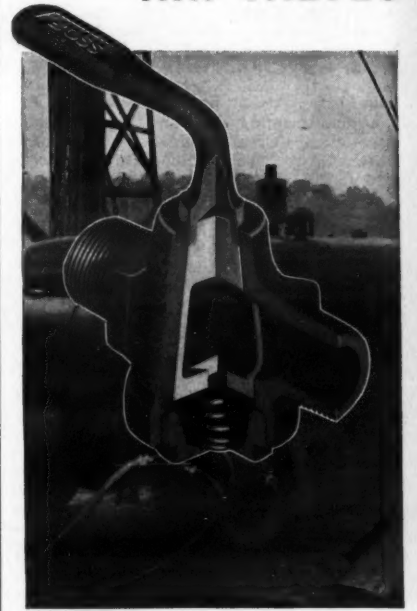
Folders describing four crawler tractors are available from the International Harvester Co., 180 N. Michigan Ave., Chicago 1, Ill. A separate folder is devoted to each of four tractors: the TD-6, TD-9, TD-14, and the TD-18. Each features a large-size photograph of the tractor, a list of specifications, and a series of smaller photographs showing the tractors in use on several types of jobs.

Specifications listed in the folders cover rated horsepower, drawbar pull in pounds, speeds in each gear computed at the rated governed engine rpm,

engine, engine clutch, track dimensions, tractor dimensions, transmission, steering clutches, steering brakes, final drive, shipping weights, etc. The folders also contain cut-away drawings of special parts of the I-H tractors, and details on the features which are claimed for each tractor.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 7.

"BOSS" Self-Honing AIR VALVES



FIRST in Efficiency Safety, Economy!

Built to withstand the roughest air service in heavy construction, road-building, mining, quarrying; on compressors, pipe lines, hose lines. *Self-honing* provides a permanent, leakproof seal. Handle and plug combined within the valve body—*handle can't come off*. Valves are quick-opening, self-adjusting, and do not require packing. Straight, full flow in open position assures maximum capacity. Male or female both ends, sizes 1/2" to 2". Cadmium plated—rustproof.

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834 NORTH SEVENTH STREET MINNEAPOLIS, MINN.



Above: Heavy grader makes short work of stones and dirt as it smooths the way for bridge approach.

Eliminating Bad Curve On New York's Route 26



Construction detail is discussed by Robert Baker (left), general foreman, and Edmund P. Smith, superintendent, both of Binghamton Construction Co.

The construction scenes shown here were taken recently at Glen Aubrey, N. Y., during a curve-elimination project on Route 26, popular north-south highway originating southwest of Binghamton, at the boundary with Pennsylvania. The project was handled by the Binghamton Construction Co., Binghamton, N. Y., and included the erection of two 50-ft-span bridges. Reinforcing Bars and H-Piles were furnished by Bethlehem.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

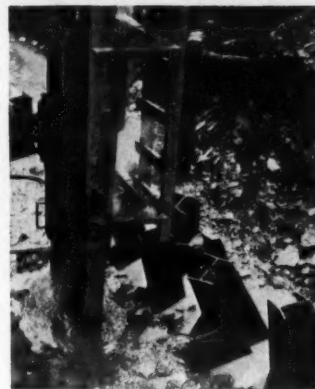
On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation

STEEL FOR HIGHWAYS

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Guard Rail Posts • Wire Rope and Strand • Pipe
Hollow Drill Steel • Spikes • Bolts and Nuts
Timber Bridge Hardware • Tie-Rods
Sheet and H-Piling • Fabricated Structural Steel



Right: To provide firm foundation, Bethlehem H-Piles are driven to solid rock. Over 100 tons of H-Piling were used in building the two bridges.



Below: Crane swings load of Bethlehem Reinforcing Steel onto partly-built bridge.



Spreading blanket of concrete over Bethlehem Reinforcing Bars in bridge deck.

Trucks Are Redesigned In 28,000-Pound Class

The YU Model motor truck has been completely redesigned by The Four Wheel Drive Auto Co. of Clintonville, Wis. Rated at 28,000 pounds, gross vehicle weight, the trucks are recommended by the company for several uses. Equipped with 5-cubic-yard bodies, they can be used to haul heavy-duty trailers. They can be equipped with road-oiling tanks or with any type of snow plow. And FWD also recommends their use with truck-mixer bodies or with International earth-boring machines.

The redesigned Model YU features a 142-hp engine rated at 2,250 rpm. Torque of the engine is listed at 425 foot-pounds. Standard wheelbase is 150 inches, with options of up to 182 inches, and body space back of the cab ranges from 121 to 190 inches. A 5-speed transmission is standard, and an auxiliary transmission is available which will provide 10 speeds forward and 2 in reverse. The YU has a vacuum-operated center-differential lock; locking the differential, FWD points out, provides positive power to both front and rear axles for climbing steep hills or traveling through mud or sand.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 123.

Front-End Loaders Are Tractor-Mounted

Two new-model front-end Tractor-Loaders are announced by the Tractor-motive Corp. of Deerfield, Ill. These include the 10-cubic-foot Model TL-B for use with the Allis-Chalmers Model B wheel tractor; and the ½-cubic-yard Model TL-W for use with the Allis-Chalmers Model WF wheel tractor.

The TL-B has a reach of 21½ inches with the bucket up and closed, a reach of 36½ inches with the bucket at carrying height and closed, and a reach of 17½ inches with the bucket up and dumped. Angle of the bucket when up and dumped is 40 degrees, and bucket-lifting time is 4½ seconds. The TL-W has a reach of 3 feet 5 inches with the bucket up and closed, a reach of 4 feet 4 inches with the bucket at carrying height and closed, and a reach of 32 inches with the bucket up and dumped. Angle of the bucket when dumped is 55 degrees, and bucket-lifting time is 8½ seconds.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 70.

Bituminous Distributors

Bituminous distributors are the subject of an 8-page catalog prepared by the Kinney Mfg. Co., 3531 Washington St., Boston 30, Mass. Special feature of the bulletin is a photo of the Kinney distributor which shows the location and relationship of its component parts. Accompanying the photograph and description is a complete list of specifications for the Kinney Model A. These cover the Kinney pump, Hercules IXB engine, tachometers, tank size and capacities, frame, heating system, piping, loading and patching hose, strainers,



FWD's redesigned Model YU motor truck is pictured here equipped with a 5 to 6-yard dump body for highway hauling work.

relief valve, thermometer, pressure gages, spray bars, circulating spray bars, nozzles, controls, etc.

The catalog also contains special sec-

tions devoted to individual parts of the bituminous distributors. Photographs and cross-sectional diagrams show the location of the Kinney pump, the

pump's operating mechanism, the Model A heating system, the slotted-type nozzles, the cab controls, etc. The catalog also lists weights and dimensions for the Models A, C, and CB, and tabulates standard equipment furnished with the distributors.

Copies of Bulletin A-48 may be obtained from the company. Or use the enclosed Request Card. Circle No. 87.

Cleco Appointments

Victor E. Dolan has been appointed Special Representative of the Cleco Division of the Reed Roller Bit Co. He will act as liaison between the general sales office in Houston and local dealer organizations. His office is located at 121 N. Jefferson, Chicago 6, Ill.

The appointment of Edward C. Nissen as Special Representative is also announced, to act as liaison between the general sales office in Houston, Texas, and local dealer organizations. His office is located at 607 Market St., San Francisco, Calif.

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To Attend the

American Road Builders' Association CONFERENCE and 46th ANNUAL MEETING

WASHINGTON, D. C.

February 7-8-9, 1949

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REMEMBER — Following the inauguration, the Nation's Capital will be full of visitors. Don't delay! To be sure of accommodations, write or wire today for detailed information and official hotel application blanks.

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Radio Revamps Job Of Road Maintenance

FM Communication System Installed State-Wide to Foster Safety and Speed Highway Maintenance

By **RAYMOND P. DAY**,
Western Editor

(Photos on pages 70 and 71)

† HOW can a highway maintenance engineer leave his desk for days at a time and still maintain constant communication with everyone in his organization who needs his help and advice?

The State of Washington has answered that question with the help of one of the most radical improvements in highway work since concrete and asphalt were discovered. For the answer is radio. All of Washington is now blanketed by two-way radiotelephone communication waves.

In the old days of not so long ago, maintenance men used to start out for a mountain road with a load of asphalt, hoping to find fair weather above the clouds. Not now. Instead, a message is flashed to the maintenance patrolman on the site, who can order the equipment and men to other work if conditions are unfavorable for asphalt work. Radio makes it possible for a given crew and equipment to work to better purpose. Money is saved, highways are made safer, and jobs are speeded up enormously.

In Washington, the state and district maintenance engineers can leave their

offices any day of the week, get in their cars, and inspect any part of the state highway system. And as their automobiles travel over the 3,900 miles of primary highways, 2,100 miles of secondary roads, and 1,600 bridges, they can see the system at first hand, meanwhile keeping in touch with all work under way on it in a manner they never dreamed possible before two years ago.

For as they drive, radio brings all the details of job operations into their cars. A maintenance foreman shifts a Snogo rotary plow. A patrolman needs a new cutting edge for his blade grader. Someone else is checking a shipment of asphalt. The whole detailed business of this vast State Highway Department is on the air, free for the taking, at 37.98 magacycles.

Frequency Band Approved

For quite a few years, efforts have been made by the Committee on Radio Communication of the American Association of State Highway Officials to obtain authorization for the use of radio for highway maintenance. If radio communication channels were unlimited, this would not be difficult. But the radio spectrum is definitely limited, and it is public property. So only in the past few months has the Federal Communications Commission decided that highway maintenance and safety are as important as law enforcement, utilities service, and the few other uses to which radio is put.

In 1946 the State of Washington jumped the gun on a trial basis, obtaining an experimental license from the FCC. This required the investment of funds in radio equipment, but the State foresaw quite accurately the outcome of the FCC-AASHO deliberations.

In fact, Washington claims to be a pioneer in the use of radio for highway

maintenance work. Back in 1932 it installed the first sets to help in fighting snow between Seattle and Snoqualmie Pass. This equipment was used until 1941, when the Highway Patrol took it over. From 1941 until 1946 the maintenance work was carried on without radio.

(Continued on next page)



**MAXIMUM SPEED—MINIMUM LABOR
CAN BE YOURS WITH THIS SLICK PAVER**

APSCO BASE PAVER

LOOK
AT THIS →

- Up to 150 tons per hour capacity
- Lays 8' to 12' width (special cut-off for 7')
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AND
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- It is self propelled
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Changing widths or depth is simple, fast!
Write for complete specifications

ALL PURPOSE SPREADER CO. Elyria, Ohio
U. S. A.

**you're guaranteed more service from
"surface peened" RAZOR-BACKS**



Look at the cutting edge of any RAZOR-BACK shovel and you'll see that the blade is 60% thicker in the center than at the sides.

This strong center backbone of 13 gauge steel extends the full length of the shovel—resists wear at the cutting edge, reinforces the frog where ordinary shovels tend to break, and forms a rigid, extra-long socket for the handle.

Yet the tool weighs no more, because we taper the sides to 17 gauge, where shovels never wear out or break.

"Surface Peened": Modern cold-working process, following heat treatment, makes RAZOR-BACK steel 2½ to 5 times tougher to resist the constant bending that makes ordinary shovels break.

All RAZOR-BACKS are deep hung, perfectly balanced. Send for Catalog, prices and name of our nearest distributor.

THE UNION FORK & HOE CO., 643 Hocking St., Columbus 15, Ohio
STONE, BALLAST, INDUSTRIAL FORKS — ASPHALT AND ROAD RAKES

RAINCAP

STOPS MOISTURE FROM FALLING INTO TRACTOR EXHAUST ... Just slip the "RAINCAP" over the open end of your tractor exhaust, and you eliminate forever the danger of moisture falling into the exhaust, injuring your tractor.

THE CAP THAT DOES NOT FORGET TO CLOSE ... Completely automatic—the "RAINCAP" is counter-balanced to open when the tractor starts and close when it stops. Rust proof—made of cast aluminum with bronze bushing—can be installed in two minutes. F.O.B. Waterloo, Iowa.

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5x	1 3/4"	1.90
6	1 1/2"	1.90
66	1 3/8"	1.90
7	2 1/2"	1.90
8	3"	2.50
9	3 1/8"	2.50
10	3 1/4"	2.50
11	3 1/2"	2.75
115	3 3/4"	3.00
12	4"	3.00
123	4 1/8"	3.00
125	4 1/4"	3.00
14	4 1/2"	3.00

WATERLOO FOUNDRY CO., WATERLOO, IOWA

In 1946 the State decided to go all out for radio use. And in June of that year it hired Clair Lewis, a brilliant young radio engineer who had worked with standard radio bands, sonar, radar—in fact, with just about everything but Frequency Modulation. The orders to Lewis were: "Get set by the end of August, so you'll be ready for autumn snows."

Lewis had a clear-cut job ahead, but plenty of hard work, and plenty of trouble.

Setting Up a Network

As things shaped up initially, the wisest move seemed to be the immediate establishment of seven permanent stationary transmitters strategically located to cover all districts in the state.

Lewis got in touch with engineers of the Motorola Co. They agreed to furnish the initial equipment which was needed to locate the spots for the main FM stations, and to help Lewis and his boys get started in the early stages. Lewis hired a small crew of five or six men, all inexperienced hands, to help.

Most of the six districts have mountain peaks or ranges, so by using high elevations for the main stations, it was theoretically possible to reach out as far as 200 miles with the 250-watt stations. Olympia, the state capital, was used as a starting point. A telephone wire was laid 1½ miles to a hill in Tumwater, where the first Motorola FM main station was located. This site was selected for several reasons—chief among them, the fact that radio signals sent out from this point could be heard all over the district. Besides, it was accessible to power lines and roads.

The greatest care had to be exercised, of course, in locating the sites for the main stations in the districts. Each of these stations had to blanket the particular district as much as possible, with a minimum of blind spots where radio mobile units would not be efficient. The stations had to be accessible with a minimum of road building, and power lines had to be close by. In addition, the sites had to be located so the stations would reach each other and the headquarters station at Olympia if possible.

It was a large order. Lewis and his men fanned out. Soon an airplane was chartered. Men with mobile sets spotted themselves around a district, and Lewis, an accomplished flier himself, flew parallel to the high mountain peaks, searching for places where radio waves operated with optimum efficiency. As he flew, he chartered elevations from the ship's altimeter.

When the right spots were found, as close to district headquarters as possible, Lewis marked them on a map and the stations were later built there.

At Wenatchee, this seemed impossible of accomplishment, for a high mountain range separates the Wenatchee valley from the cities in western Washington. For days, Lewis and his men flew and drove through the country searching for a place where radio signals would go through. And finally, tired and discouraged, they

stumbled in late one night on the radio beam coming in clear and strong from Olympia, on the other side of the mountains! They checked and rechecked. The broadcast band was less than a mile wide; beyond those limits Olympia couldn't be heard.

Excitedly they put a sending set on

one of the high hills near by. Tests showed that it would cover the Wenatchee district, and also send and receive over the mountain range to Olympia. Another station was born.

Lewis had known a building foreman named Rudolph Elsner, when the men worked together in the Navy. He per-

suaded him to come down during his vacation to help. Elsner's job was to gather a construction crew together, and to put up the concrete buildings and the high, slim steel radio masts. Elsner got interested in this young, imaginative outfit, and stayed on. The

(Continued on next page)



It's easy to spot a winner

Take these two young "experts". They've spotted one in the 15-B dragshovel. The way it consistently makes smooth, big-load passes is one of the reasons why the 15-B is tops in the ½-yard class.

And if the youngsters follow the machine

around, they'll see plenty of other reasons too . . . substantial performance reasons like quick convertibility to other front ends, outstanding output with any front end, and low maintenance requirements.

So take a tip from the "tots" — look into Bucyrus-Eries. You'll find they're your best buy for sustained high production in dirt or in rock.

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The BEST buy Bucyrus,
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OMAHA Dragline Buckets, the original lightweight buckets, have been earning this extra profit for many contractors through many years.

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Radio Revamps Job Of Road Maintenance

(Continued from preceding page)

radio construction gang today can do anything, and it frequently does.

The Vancouver district station was the toughest one of all. Vancouver, in the Columbia River valley, is hemmed in on all sides by mountains. For days and days the men flew and searched. They found one spot in all the country where they could hear Olympia. It was across the Columbia River in Oregon.

With characteristic disregard of red tape, boundary lines, and other such minor obstacles, Lewis reported the good news to his chief, James H. Marshall, State Maintenance Engineer, and said he'd have the station set up in no time.

"Just a minute, here. Not so fast," said Marshall and Clarence B. Shain, State Highway Director, in unison. "Let's keep Washington's radio equipment in Washington. We're on good terms with Baldock down there in Oregon, and we intend to stay that way!"

Lewis resumed the search.

Fruitlessly he combed the entire mountainous area to the north of Vancouver. One night, as he was about ready to give up, one of the boys pointed to the map.

"Right here above Winlock is the only place we haven't looked," he said. "Let's fly by there on our way to Olympia."

"It was nothing but damn-fool luck," Lewis says now. "We got up there and found the only place in all that country where a station would work. We could hear both Olympia and Vancouver."

Right there a "repeater" station was erected. This set-up will operate by itself automatically, unmanned. Repeater stations are triggered, or switched on, by the radio wave, and then they relay the message towards the other station. Several of these stations are now in operation, and one permits 300 miles of communication between Olympia and Spokane.

The seven main stations, all equipped with Motorola FM radiotelephones, were located, checked, set up, and operating by the August deadline.

Division Stations Set Up

From there on, the job was also plain. Division stations, or subpoints, had to be set up to give good local coverage in each district. One tough district, full of mountains and canyons, needed six 50-watt stations, and altogether 22 of these smaller stations were set up to cover the districts.

As much care as possible was used in selecting the sites for these division stations. But in several cases, Lewis, who was hard-pressed for time, set them up temporarily more by instinct than anything else. In several cases it was then necessary to move the stations when the crew had more time. Motorola and some RCA equipment is in use in these stations.

In the meantime, more and more mobile units were being fitted out. The automobiles of all district engineers, maintenance foremen, state division heads, and various other key personnel received mobile two-way radio-telephone sets. Snow plows were equipped too. As for trucks, good radio engineers told Lewis it was impossible and impractical to install two-way radio in a maintenance truck. But Lewis found a spot of unused space under the dump-body frame, had watertight metal boxes made to hold the radios, and proved that they would work.

The best workmanship and materials went into the installations. Lewis knew that if radio communication worked perfectly in the State of Washington, other states would be quick to follow suit. A perfectionist with an uncanny sense of the practical, he had main

stations set up in concrete houses, and permanent steel masts erected for the aeriels.

At first, old-time maintenance men regarded the new-fangled contraptions with a mixture of disbelief and animosity. Some believed the main office was trying to keep tab on all their activities. But they soon learned that they and their mobile units had the priority. Instructions went out from the start that in case of emergency, mobile stations were to cut in on any broadcast that might be under way on the district or division stations.

One by one, the maintenance foremen and operators found themselves the better off for this rapid method of communication. For instance, one Snogo operator froze fingers on both hands

when he was tinkering with an engine in a howling blizzard. His radio brought help on the run, in time to save his hands. Moreover, radio sets in the mobile stations were responsible for several thrilling snow rescues from blocked highways.

But the one thing which pleased maintenance men most of all was the fact that radio made their work easier and speeded countless details. Maintenance men are hard to find, but with radio, small maintenance gangs can operate so efficiently that they can do the work of much larger crews.

One grizzled old-timer on Snoqualmie Pass grumbled, "They coulda bought me another Snogo with what they spent on the radio station here." Then he suddenly recalled that the two

Snogos he had, equipped with radio, had taken care of one of the worst winters on record, with leisure time to spare!

And so it went. In a matter of days or weeks, maintenance men everywhere became "converts".

Helps Out in Flood

When the disastrous 1948 Columbia River flood swept down towards the ocean, Vanport was inundated. Lives were lost, the lowlands were under water, and telephone service was cut off. Radio came to the rescue.

The main station at Vancouver immediately went on a 24-hour-per-day shift. Mobile units were rushed down and spotted strategically all around the

(Concluded on next page)

**More tons per day
More hours of trouble-free operation
More profits** } **and Lower Costs**

PORTABLE CRUSHING and SCREENING PLANTS



The Cedarapids Master Tandem—master of aggregate producing jobs. Put a portable primary ahead of it and you have a complete quarry plant ready to do double duty for you. Operators report 150 tons an hour average production.



A Unitized Plant set up almost in the middle of an Oregon forest, typifies the portability and adaptability of Cedarapids equipment. Take it where you need it and put it to work in a hurry. Capacities of 250 tons per hour... and more... to meet any specifications.



One of the most popular of the Cedarapids line is the Junior Tandem with many contractors telling of production of more than 150 tons per hour, crushing to 1/2" with 75% of the material needing reduction. Big capacity and low cost at its best.

OPERATORS everywhere report they are getting larger volume production, greater flexibility and more hours of trouble-free operation with Cedarapids portable crushing and screening plants.

The installations shown are typical of Cedarapids equipment everywhere. With their large capacity and wide product diversification they turn out better products at lower cost with very low maintenance. These plants are made of Cedarapids matched crushers, screens and conveyors—balanced and coordinated for most efficient operation. They are built in sizes and types to fit every product requirement, regardless of the size of the job, you'll make more profit per ton with Cedarapids equipment.



In Wisconsin, a Cedarapids Pitmaster produces aggregates for secondary roads—There's lots of crushing capacity in the 10' x 16' jaw crusher and 16' x 16' roll crusher. Cedarapids horizontal vibrating screen assures the accurate grading required today.

Cedarapids
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The IOWA LINE of Material Handling Equipment Includes:

ROCK AND GRAVEL CRUSHERS • BELT CONVEYORS—STEEL BINS • BUCKET ELEVATORS • VIBRATOR AND REVOLVING SCREENS • STRAIGHT LINE ROCK AND GRAVEL PLANTS • FEEDERS—TRAPS • PORTABLE POWER CONVEYORS • PORTABLE STONE PLANTS • PORTABLE GRAVEL PLANTS • REDUCTION CRUSHERS • BATCH TYPE ASPHALT PLANTS • HAMMER DRAG SCRAPER TANKS • WASHING PLANTS • SOIL COMPACTION UNITS • STEEL TRAILERS AND TRAILERS • KUBIT IMPACT BREAKERS • See Your Cedarapids Distributor For Full Details

flooded country. Any kind of message the frantic public wanted to send was sent. Officials of the Portland Office of the Corps of Engineers were amazed to see the mobile sets range out 30, 40, and even 50 miles. The Vancouver station, triggering the repeater up near Kalama, flashed message after message upstate.

Radio needed no special selling before the flood, but that disaster clinched its position as one of the newest and most useful tools of a highway department.

Peculiar Conditions Found

In the present radio system, several unusual conditions exist which are theoretically impossible. For example, the main station at Olympia can talk to and from the 50-watt division station

at Goldendale, 108 miles away. And on a direct line between those two points is a towering 12,000-foot mountain peak, theoretically impermeable to an FM wave. This peculiar phenomenon has now been noticed so much that Lewis believes a high peak interposed exactly between two stations is a help, rather than a hindrance. The theory has been used successfully more than once to locate suitable transmitter sites.

Last summer, State Maintenance Engineer James Marshall was returning from a motor trip down to Salem, Oreg., on business. Less than 20 miles out of Vancouver, he tried to get in touch with the main station.

Something was wrong. There was no answer from the main station, but another voice came in clear and strong.

Marshall started a conversation, and found himself talking to a highway maintenance man in Onondaga County, N. Y., nearly 3,000 miles away! He asked the New Yorker to relay his message to Olympia, Wash., where it was flashed back to Vancouver. He covered 20 miles of geographical distance by a 6,000-mile by-pass.

This peculiar phenomenon is called "skip". It happens only in the winter, ordinarily. Radio waves angle upward, and about 1,500 miles from their point of origin they hit at an angle against several layers of ionosphere. At this point they deflect back to earth at the same angle. New York and Pennsylvania highway business comes in quite often in the winter over the Washington sets.

This is one of the problems yet to be solved. Lewis is still too busy covering his own state with stations to bother with it. There is no interference from any of the states adjacent to Washington, some of which also use radio to a more limited extent.

The radio waves act peculiarly in canyons. Very frequently they hit the sharp edges of a canyon, and a mobile station which should theoretically be dead is able to enjoy perfect communication. Likewise, deep canyons will catch radio waves and, like a pipe line, funnel them on. Lewis knows now that the waves will bend over rocks.

From mountains often 6,000 feet high, the stations cover a tremendous range of country. In general, the main stations reach 150 miles, the division stations about 65 miles on 50 watts, and the mobile stations about 20 miles. About 135 of the 200 ultimate mobile stations are now in service.

Radio Maintenance

As the main stations were completed, Lewis left one man of the crew behind to operate and maintain the equipment. Very little maintenance work has been necessary. The six district stations use a full-time radio operator, but the division stations are so located that a maintenance clerk can be a radio operator perhaps 10 per cent of his working day, and perform other routine work the rest of the time.

One of the duties of each station each day is to furnish a weather and highway-condition report. These data are collected early each morning in Olympia and given to the Chamber of Commerce, local radio stations, newspapers, and interested citizens. This practice is resulting in excellent public relations, for it keeps the people well aware that they have an alert highway department Johnny on the spot.

Lewis Builds a Snow Gate

Perhaps the most audacious scheme of all is Lewis' plan to control traffic on Snoqualmie Pass by means of radio-activated snow gates.

Suppose a bad snow slide rattles down on the pass, or a truck gets stalled across the road, as frequently happens. The maintenance patrolman will flash word to the radio station on Snoqualmie Summit. In an instant, the man there will press a button for ten seconds. Far below, on either side of the pass, sirens will howl and semaphore gates will slowly lower across the highway.

Perplexed motorists will see nobody around, but a calm voice will explain over a loudspeaker at each gate what has happened. The people will be told to be patient for fifteen minutes or so, until the road can be cleared. Soon afterward, before the drivers get nervous or angry, a state patrolman or a maintenance man will be at each gate.

And the maintenance men up on top, fighting with characteristic energy to remove snow and snarls of traffic, will have only those cars trapped between the gates to contend with. Naturally, all the cars on the safe side of the road block will be permitted to go on down, on their way.

When it is all over, the radio operator will press his button again, relays will act, the gates will open, and a voice from the loudspeaker will thank the motorists for being patient. They will go on their way, indebted to radio for a shortened wait and for immeasurably increased traveling safety.

Thew Co. Promotes Maynard

Promotion of Robert T. Maynard to Export Manager is announced by The Thew Shovel Co. Mr. Maynard has been transferred from the post of District Sales Manager of Thew's Mid-Atlantic territory. He formerly was Export Manager for The Osgood Co. and The General Excavator Co.

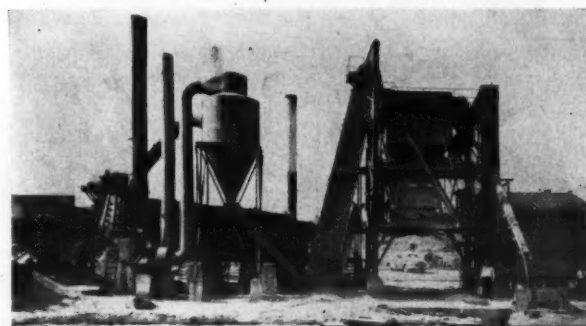
sts with Cedarapids Equipment!

BITUMINOUS MIXING PLANTS

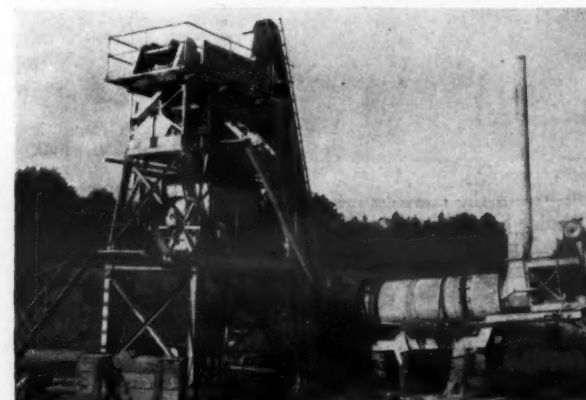
THESE bituminous mixing plants are typical of Cedarapids plants everywhere... producing a constant flow of a variety of bituminous mixes for building dependable, all-weather roads and streets. Each feature is built for simplicity of operation, maximum efficiency and easy portability. They'll deliver more tons per hour and they'll not only do it better, but at a lower cost. Made up of matched screens, pugmills, elevators and other component parts, Cedarapids Bituminous Mixing Plants produce thoroughly mixed materials, with each particle of aggregate completely coated with bitumens. When buying bituminous mixing plants, buy the best. Buy Cedarapids — a complete line of batch-type and volumetric-type mixing plants.



300 to 400 tons per day of thoroughly mixed bituminous material is the average of this Cedarapids Model "FA" super-portable batch-type plant. With drier and dust collector, you can meet the most exacting specifications.



Cedarapids Model "E" with dust collector in Pennsylvania produces large volume of accurately batched and thoroughly mixed black top for roads and airports at remarkably low cost, and it's portable, too.



In Alabama, one of the newest Cedarapids 1,000 lb. Model "A" batch-type plant turns out 75 to 100 tons per day. Here's a plant you can set up quickly for all your medium-sized jobs.

20 to 30 tons per day of patching material is the job for a Cedarapids Patchmaster. It's a real low cost, lightweight, profit maker that you can use as portable or stationary continuous-mix plant. The Master Mixer — also a continuous mix type — has a capacity of 100 to 150 tons per hour.

OWA MANUFACTURING COMPANY
Cedar Rapids, Iowa, U. S. A.



This flexible template can be set and locked to any shape, contour, curve, or radius. When unlocked, it springs back to its original position.

Curve-Drawing Aid

An adjustable template for duplicating complex curves is announced by C. H. Clark & W. E. Poggenburg, 4900 Wynnefield Ave., Philadelphia, Pa. It can be used for reproducing irregular curves in the design of masonry bridges and arches, in form building, etc.

The flexible template is made from a piece of spring steel which is clamped into position and locked. When un-

locked, it snaps back to its original position ready for re-use, the manufacturer states. The unit is available in any length over 2 feet, in intervals of 1 foot.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 62.

Highway Conference Resumé

Proceedings of the Ninth Annual Highway Engineering Conference have been published by the University of Utah at Salt Lake City. Bulletin No. 39 was compiled and edited by Professor A. Diefendorf, the Conference Director and Head of the Department of Civil Engineering at the University. A limited number of the bulletins are available without charge.

Reports submitted at the conference cover a wide range of subjects—economics of low-cost roads, compaction research, soil research and surveys, economics and social aspects of controlled-access highways, parking fa-

cilities, portable aggregate plants, lighting, bituminous pavements, and other topics connected with the design, construction, and maintenance of highways.

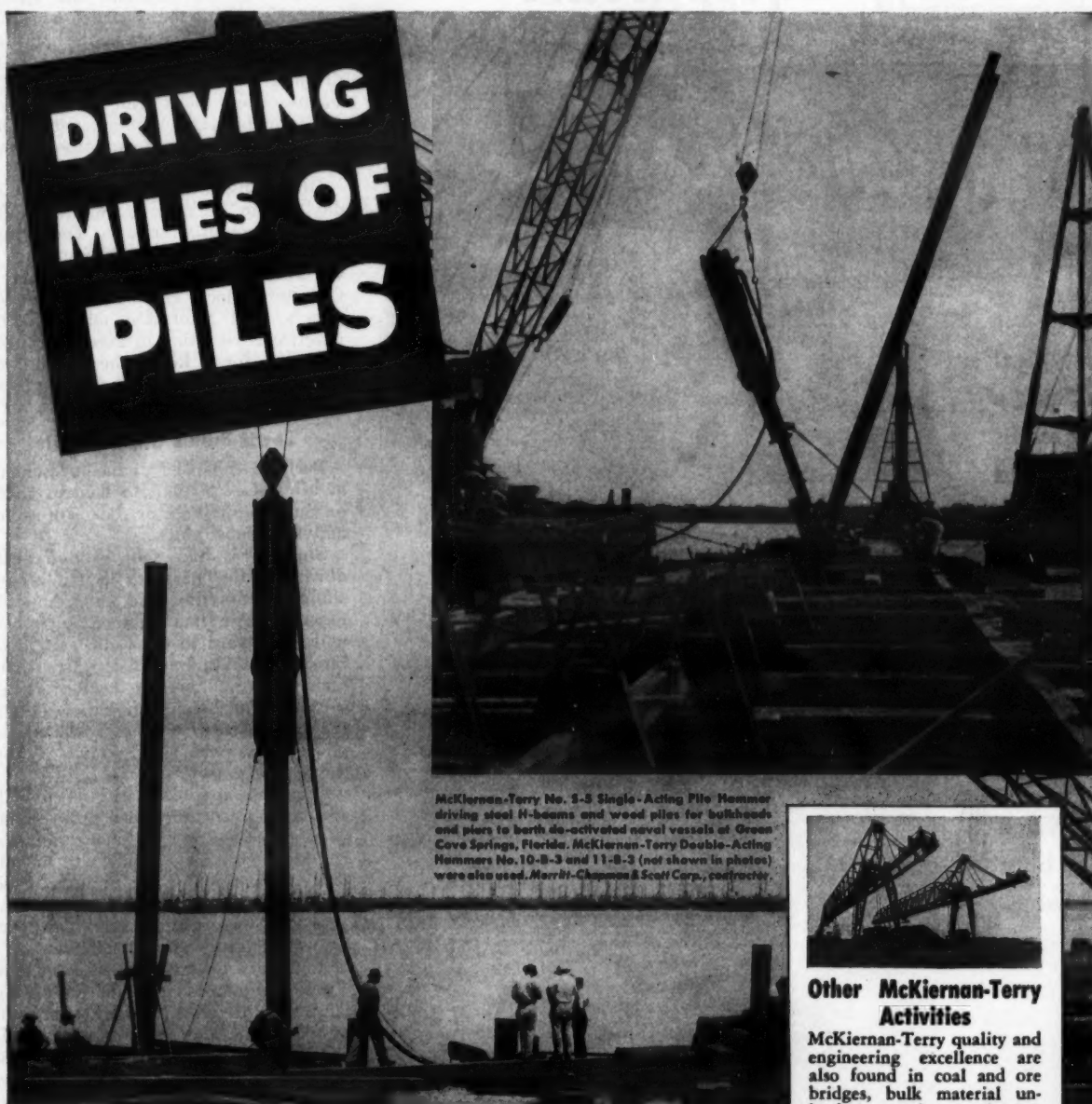
Concrete Placement By Pumping Methods

The third edition of "Pumpcrete Practice" has been released by the Pumpcrete Division of the Chain Belt Co., 1666 W. Bruce St., Milwaukee 4, Wis. This 193-page book is intended to serve as a source of reference for those actively engaged in any phase of concrete placing by pipe-line and pumping methods.

The book contains a complete description of the Rex Pumpcrete equipment. It covers distributing methods, placing costs, concrete mixtures used, and other Pumpcrete data including specifications, cleaning of equipment, space requirements, and so forth. The third edition also illustrates and describes several typical jobs which used Pumpcrete methods in the construction

of bridges, buildings, dams, and other structures. Several of the job descriptions are reprinted from magazine articles which have appeared in the last few years.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 100.



McKiernan-Terry No. 5-5 Single-Acting Pile Hammer driving steel H-beams and wood piles for bulkheads and piers to berth de-activated naval vessels at Green Cove Springs, Florida. McKiernan-Terry Double-Acting Hammers No. 10-B-3 and 11-B-3 (not shown in photos) were also used. Morritt-Chapman & Scott Corp., contractor.

To provide a home port for 554 de-activated U. S. Navy ships of the Florida Group, Atlantic Reserve Fleet, required building a long sheetpile bulkhead and eleven 1,845-foot steel and concrete piers—totalling more than four linear miles of construction.

9,990 steel H-beams and over 10,000 batter and vertical timber piles had to be driven. For this big job, McKiernan-Terry Hammers—two S-5 Single-Acting and 10-B-3 and 11-B-3 Double-Act-

ing—were the contractor's choice... a choice based on years of dependable experience with McKiernan-Terry Hammers on difficult projects of every type.

In the McKiernan-Terry line of hammers, engineers and contractors can always find a standard size exactly suited to any specified requirements. A choice of ten sizes in double-acting hammers, five single-acting hammers and two double-acting pile extractors.



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Plastic Separators Used in New Battery

A storage battery for use with automotive and other electrically driven equipment is announced by the Reed Battery Corp., 6850 Farndale Ave., North Hollywood, Calif. The Thermo-Electro battery is designed to provide quick starting, extra power, long life.

As a special feature of the Thermo-Electro battery, the negative and positive plates are clamped and welded together at both top and bottom. This is said to prevent the plates from wearing into the bridges of the case, and to cut down on shorts caused by buckled plates or by oxide or pieces of the separators which are shaken loose and accumulate in the bottom of the case. The separators are made from plastic polystyrene, and, according to the manufacturer, will not burn, crack, warp, or shrink. The manufacturer also

points out that the battery will not be damaged even if the level of the acid falls below the tops of the plates.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 45.

The Use of Steel Forms For Concrete Structures

The use of steel forms in concrete pouring is discussed in a 28-page catalog distributed by the Irvington Form & Tank Corp., 43 Cedar St., New York, N. Y. Atlas forms are made in styles for walls, floors, columns, dams, manholes, and circular tanks. The catalog features a graphic presentation of several jobs in which these forms were used.

The booklet is designed as an instruction manual and contains detailed information on the use, handling, and erection of the Atlas steel forms. It

describes preparations prior to erection; the way in which the Atlas forms are secured and tied together; how corners are formed; how provision is made for wood forms for windows, doors and other openings; stripping of forms; and preparations for re-use. The catalog also contains information and specifications for the complete line of Atlas Speed Forms, and drawings which show typical cross sections of form applications. The booklet is thoroughly illustrated by means of photographs and diagrams.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 75.

Vice Pres. for Haiss Co.

W. E. Madden has been appointed Vice President of the George Haiss Mfg. Co., Inc., Division of Pettibone-Mulliken Corp. He was formerly Sales Man-

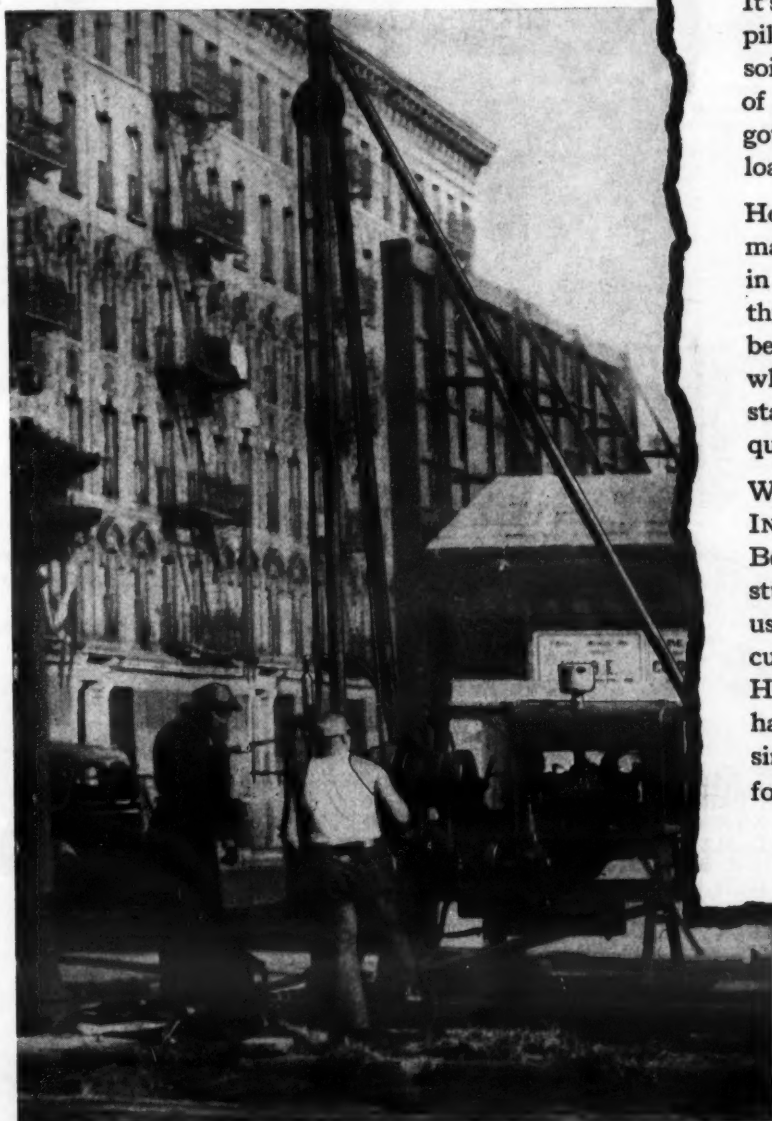


"Just about now they're getting out the snow plow back home."

ager of the Conveyor Division of the organization.

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But What Supports the Piles?



It's the soil that actually bears the load, not the piles. The piles simply transfer the load to the soil. So it isn't just a matter of installing piles of a given depth and a given diameter. You've got to make sure that the soil can carry the load the piles will transfer to it.

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WESTERN, in cooperation with the DRILLED-IN CAISSON CORP., is prepared to make Soil Borings and also comprehensive engineering studies of the results. We recommend that you use our FREE CONSULTATION SERVICE. Discuss your problems with one of our engineers. He speaks with authority, for WESTERN has handled every type of foundation problem since 1924... without a single failure. Send for Catalog C.

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Mile-High Airport Improved at Denver

New Asphaltic-Concrete Runway and Taxiways Part Of Million-Dollar Job At Stapleton Field

† PACED by a fast-moving fleet of rubber-tired earth-movers, bituminous paving equipment was mobilized to surface Stapleton Field, at Denver, providing new runway, taxiway, and loading-stand facilities. The big job, which was done for the City and County of Denver by Western Paving Construction Co. of Denver, during 1947 and 1948, amounted to \$1,000,000. Thanks to the work which was completed last fall, Denver's municipal airport is now able to handle commercial planes with wheel loads up to 120,000 pounds.

More and more, air traffic through the west now centers around the Denver airport. United Airlines recently moved its entire operational center there. Eight other airlines use the mile-high terminal. And it also serves private planes.

Funds for the improvement of Stapleton Field did not generally keep pace with the Denver airport's demands. In 1947 the airport received a heavier parking apron built by the same contractor. Work completed in the 1947 program also included reconstructing the south portion of the north-south runway to support a gross load of 90,000 pounds, constructing a warm-up pad at the west end of the east-west runway, reconstructing the south half of the loading apron and resurfacing the entire apron, seal-coating and placing cover aggregate on the northwest-southeast and the northeast-southwest diagonal runways, providing adequate drainage facilities for the north-south runway, and incidental and appurtenant work.

The 1948 work was done with the aid of money from the Civil Aeronautics Administration.

The contract was started on May 10, and was scheduled to be completed by December 1. Work consisted of grading and draining an area 500 feet x 8,700 feet and paving an area 150 feet x 8,500 feet for the new east-west runway, reconstructing the north-south taxiway

and the north portion of the north-south runway, installing elevated marker lights on the east-west runway, and performing miscellaneous work including fencing, grading, drainage, and electrical installations.

Grading, which amounted to about 512,600 cubic yards of earth work, was subbed to the Denver firm of Colorado Constructors. Pipe work, miscellaneous drains, and fencing was sublet to Stirn & Co. And the Sturgeon Electric Co. did all electrical work under a subcontract. All engineering and design on the new work was done for the City of Denver by Alfred J. Ryan of Denver.

Western Paving Construction Co. produced and processed the 1-inch-



C. & E. M. Photo
Caterpillar DW10's and scrapers load up with the help of a D8 pusher in a borrow pit on the Denver airport job. Colorado Constructors subbed this grading work from Western Paving Construction Co.

minus select base-course material, mixed and laid the asphaltic-concrete paving, and placed the seal coat and cover aggregate.

Heavy Bases Laid

Specifications called for a substantial

base course, for a commercial airfield. The modified Proctor system of soil-density sampling was used, and the specifications required 90 and 95 per cent for subgrade compaction—the latter figure for those areas under
(Continued on next page)



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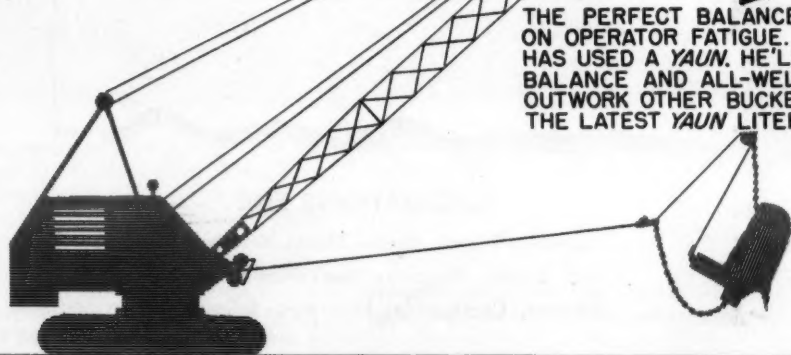
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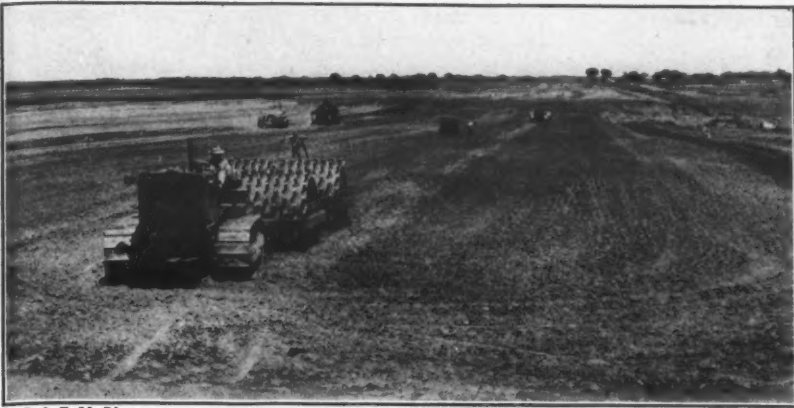
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C. & E. M. Photo

This overall view of a runway fill at Stapleton Field shows the two McCoy sheepfoot rollers, water wagons, and other fill equipment hard at work.

pavement. Then, depending on the bearing value of the soil, from 5 to 11 inches of a select sand cushion was laid and compacted on this subgrade.

A 10-inch base course of 1-inch-minus rock was laid for all construction, except for the north-south taxi-

way and for 10 per cent of the runway length at each end of the runway, where an 11-inch base thickness was used. After the aggregate base course was laid, it was watered, mixed, and compacted to not less than 95 per cent maximum density at optimum moisture.

The new east-west runway and the north-south taxiway are surfaced with 3 inches of asphaltic concrete, while 2 inches was placed on the remainder of the work. The placing of seal coat and cover aggregate finished the job.

Earth Work Goes Rapidly

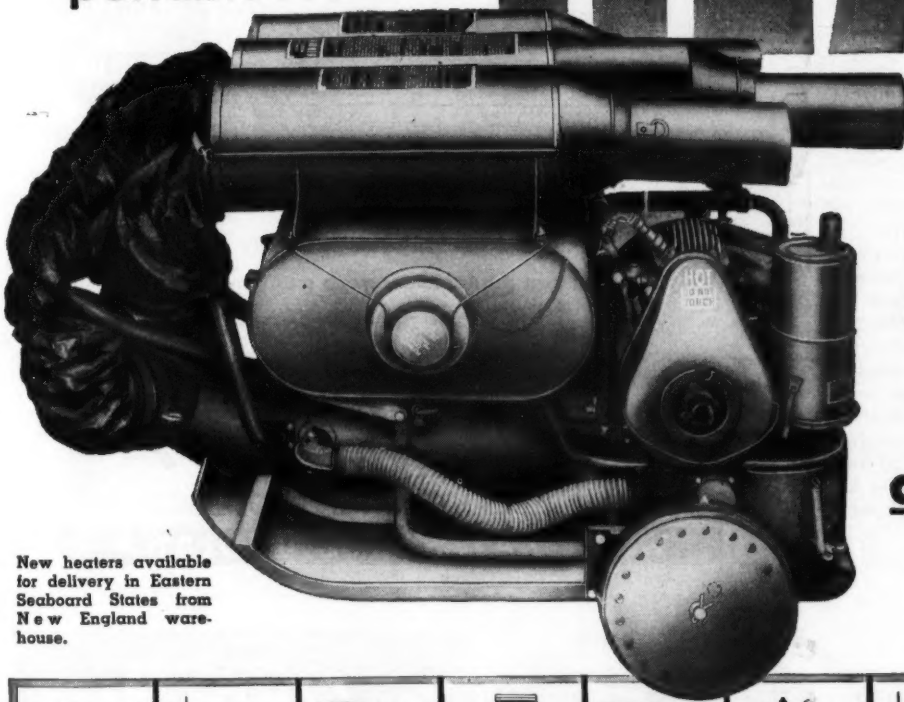
Excellent progress was made on the grading, despite a stratum of soft sandstone about 8 inches thick, and a wide variety of soil conditions. All grading was done by Colorado Constructors with its fast rubber-tired earth-moving fleet.

Only three crawler-tractor-scraper units were used on the job. All three tractors were Caterpillar D8's; the scrapers were Caterpillar and LeTourneau. Three Caterpillar DW10's with Caterpillar scrapers were used, with two LeTourneau Super C Tournapulls and a new Wooldridge Terra Cobra which had been placed on the job for a demonstration by the Wooldridge distributor at Denver.

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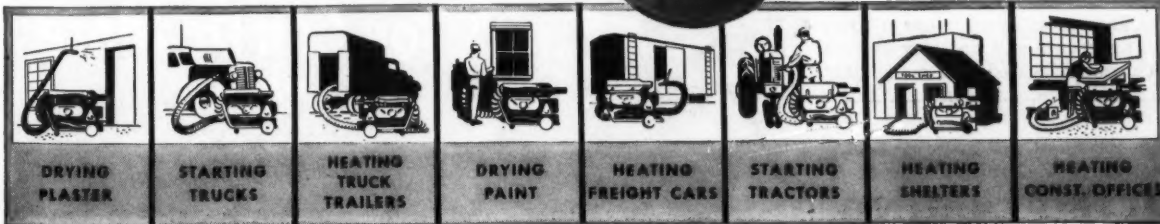
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C. & E.M. Photos

Mile-High Airport Improved at Denver

(Continued from preceding page)

Processing equipment included two D8 dozer and pusher tractors, two Caterpillar No. 12 motor graders, a DW10 with a double John Deere disk, three water-tank trucks from 1,500 to 2,000-gallon capacity, and an International tractor with a Bros pneumatic Wobble Wheel roller. Two D8 Caterpillars also were used with the "big boys" of compaction—two tandem sets of McCoy sheepsfoot rollers.

When soil borings were taken during the design stage of the project, moisture content varied from 3 to 11 per cent. When construction started, the moisture content was found to be as high as 17 per cent—thanks to the heavy rains and snows which occurred just prior to construction. Optimum moisture for these soils varies from 10 to 13 per cent. Aeration and manipulation were therefore necessary to obtain the desired soil conditions.

At first, some difficulty was experienced in obtaining the required densities. It was easy to get within 2 to 3 per cent, but from that point on, the going was rough. So a double disk was brought in behind a DW10, and more attention was given to thorough mixing and to securing optimum moisture through the lifts. This corrected the difficulty.

Long-haul work was all handled by rubber-tired equipment, with the scrapers confined to short-haul work. Some truck work was done early in the job, using a 3/4-yard Koehring dragline for loading, but more efficient operation was secured using DW10's and scrapers. All of the equipment was loaded with the aid of a D8 pusher tractor.

Due to the scope of the work, some of the construction equipment had to cross taxiways which were in constant use. In each of these instances, a flagman was stationed at the crossing, under instructions from the control tower. Thus, air and ground traffic were coordinated to prevent accidents.

The earth was excavated in thin lifts, dumped in lifts from 4 to 6 inches deep, and leveled off by powered blades before processing was begun. The water trucks hauled from a city hydrant at one corner of the field, and made several passes over each lift as it was turned by the disk to blend the water in more uniformly. The water was distributed by fine-nozzle spraybars, and moisture and compaction tests were taken in each lift.

The select sand for the cushion was excavated from a low hill near the administration building and hauled to the construction site. It was placed in lifts not exceeding 5 inches, was processed much as the dirt lifts had been, and was rolled to density by the McCoy rollers. On this sand material, however, the final 3 inches on the top of the lift was left relatively uncompacted behind the sheepsfoot rollers. So when a lift was topped out, the Bros pneumatic roller was used to develop the required density in the upper half of the last lift.

The peculiar sandrock stratum succumbed to the persistent work of the grading equipment, helped by the bulldozers. While this formation slowed operations somewhat, the material was successfully used in the embankment.

Grading operations were well organized as to layout. Large areas were kept open for work, and the haul distances were balanced as much as possible. The average length of haul was 1,900 feet.

As fast as the Colorado Constructors crews could finish a piece of grading, Western's aggregate crews were ready to run the base. One comparatively short section of the field contained 250,000 cubic yards of grading, and completion of this embankment was a key factor in the completion of earth work as a whole.

Base-Course Methods

Select, screened, and crushed material for the base was produced and laid by the prime contractor. Western Paving Construction Co. conducts its operations close to Denver because it has a commercial aggregate and hot-mix asphalt plant centrally located and convenient

to Denver work. Three stages of base-course work at Denver's airport are shown here. An Adams motor grader (left) mixes base material while the water-tank truck in the background sprinkles it. Then a Bros pneumatic roller compacts it, and, finally, a Littleford pressure distributor shoots an asphalt seal coat on the completed base.

The 1-inch-minus rock, with 7 per cent of 200-mesh material as binder, was produced in this central plant and trucked out to the job. The plant, on Washington Boulevard, is about 9 miles one way from the airport.

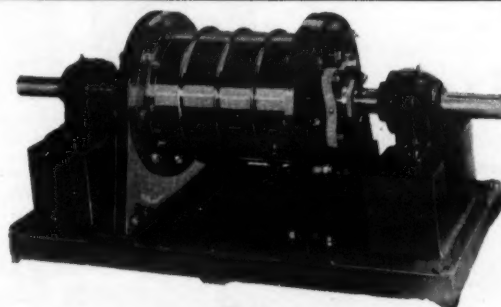
An effective method was used to add the required moisture to the base-course material at the plant. Two water jet sprays were rigged below the storage hopper, and when the trucks took on the aggregate, the operator also opened water valves on these jets. The

water fed into the material as it fell on the truck beds, and very little water manipulation outside of routine sprinkling had to be done on the job.

Eight trucks, mostly Internationals, with Fruehauf and Trailmobile 18-ton trailers, transported the select material out to the job. They dumped it according to the calculated content of a 5-inch lift per station.

Processing consisted of road-mixing the material well with a Caterpillar No. 12 and an Adams 414 motor grader.

(Continued on next page)



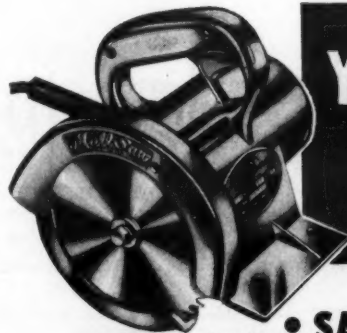
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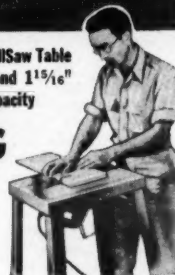


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C. & E. M. Photo
H. C. Stillman, Project Manager for Western Paving Construction Co., looks over a Lock Joint pipe installed at the Denver Airport by a subcontractor.

When the windrow was thoroughly mixed and had the proper water content, the machines cut the material back a little at a time, and the base was laid in successive lifts. As these machines bladed the material out lightly, an International-drawn Bros pneumatic roller compacted the aggregate to high density. Specifications required a minimum of 95 per cent, but this system regularly accounted for 98 and 99 per cent. It did so early in the job, too.

The base was laid in this manner in sections as long as airplane traffic on the ground would permit. Usually the material could go in in sections from 500 to 900 feet long. The base was finished with pneumatic-roller and motor-grader work, and no flat-wheel rolling was necessary.

After a section was finished, it was primed ahead of paving by shooting 0.3 gallon of MC-0 asphalt per square yard with a Littleford pressure distributor. This asphalt was hauled from plant storage early in the job, but later, when greater quantities were consumed, cars were shipped close to the airfield and a Bros car heater assisted in unloading the prime coat. The asphalt penetrated the base from $\frac{1}{2}$ to $\frac{3}{4}$ inch, and formed a good bond between the aggregate and the paving to follow.

The asphaltic-concrete mix was set up on the basis of 6 per cent of 120-150 asphaltic cement. The commercial plant owned by Western, a 4,000-pound Standard mixing plant, turns out asphaltic concrete for all the company's work in the Denver area. The material for the Denver airport paving was mixed to the specifications of the airport. No other work was done while airport paving was in progress.

The material was trucked to the airport and laid by a Barber-Greene Tamping-Leveling Finisher. Specifications permitted all the paving to be laid in one course. Project Manager H. C. Stillman moved two Galion 10-ton tandem rollers in to the job to finish the pavement behind the lay-down machine.

Seal-Coat Cover Aggregate

Western has developed an efficient method of applying cover aggregate to seal coats. On this job, a Buckeye spreader box was attached to the front end of a small Galion motor grader, where it could be controlled by the grader controls. A truck dumped its load in this spreader box. A distributor worked ahead, sealing the asphaltic-concrete surface with 0.25 gallon of RC-2 cut-back asphalt. The motor grader moved onto the freshly oiled surface and distributed the armor chips in a thin course.

When the spreader box was empty, the machine moved back just far enough to let the next truck back in on the chipped area to dump its load in the spreader box. The grader operator nudged the truck when empty, to

hurry it out of the way, and resumed spreading.

The matter of an alert operator is quite important, according to Stillman. "Last year we had a very skilled man, and our production doubled when he was on the job," he said. It was not uncommon to distribute 10,000 gallons of asphalt seal in a day using this system.

The armor chips, after being spread, were rolled thoroughly to bed them in the asphalt seal. Later, excess chips were swept off by a power broom.

Miscellaneous Work

Considerable trench excavating, pipe laying, and structural backfill were necessary to install a drain system and electrical conduits, and to extend the outfall sewer. The Koehring $\frac{3}{4}$ -yard dragline excavated for the sewer-line extension, diverting the channel to one side. Due to mud and other unstable ground encountered in the old channel, it was necessary to excavate below the assumed base for the pipe and to

stabilize the subgrade for the placement of the pipe. The concrete pipe was made by the Lock Joint Pipe Co. in its Denver factory, hauled to the job, and laid by the dragline.

Considerable trench excavation was done by an old trenching machine

which dated back to 1915 and whose manufacturer is long dead. A new Barber-Greene trenching machine was also used.

Compacted structural backfill was handled generally with an Ingersoll-
(Concluded on next page, Col. 2)

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equipment with the 100% traction of Walter 4-Point Positive Drive. Unlike conventional drives, there are never spinning wheels to stall your Walter unit. Instead, Walter patented automatic locking, torque proportioning differentials always concentrate the most power on the wheels having the most traction.

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Capacity of the Scoot-Crete powered wheelbarrow is 14 cubic feet, and it turns in a 6½-foot circle.

Powered Wheelbarrow Can Tote 2,000 Pounds

A powered wheelbarrow with a 14-cubic-foot capacity is manufactured by Getman Bros., South Haven, Mich. All operations of the Scoot-Crete are controlled from the operator's seat. The unit is powered by a 6-hp air-cooled Wisconsin engine, and is said to travel under its own power at speeds of from 1 to 15 mph through a 4-speed transmission.

The manufacturer points out that because the unit weighs only 1,000 pounds when empty, it can be driven onto scaffolds in order to dump loads where they are needed. It is steered by a single tail wheel, and will turn in a 6½-foot circle. The edge of the bucket is 39 inches high to permit direct loading from a concrete mixer. The Scoot-Crete is 7 feet 4 inches long, 43 inches wide, and will carry a maximum load of 2,000 pounds. It has one 8:00 x 4 and two 7:50 x 10 rubber tires.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 52.

Mile-High Airport Improved at Denver

(Continued from preceding page)

Rand and a Le Roi portable compressor and several pneumatic tampers. A labor crew shoveled the dirt in ahead of the tampers in thin lifts, and water was sprinkled where necessary.

While the Denver airport will still require future development, this job helps to make it one of the best in the trans-mountain west. Future plans include construction of a new north-south runway to act as a dual runway with the present north-south runway.

Personnel

The job was under the general supervision of Alfred J. Ryan, with T. E. Straley as Resident Engineer.

H. C. Stillman was Project Manager for Western, and was in direct charge of all field construction. U. S. Siegrist was in charge of Colorado Constructors work, and Jack "Old Beartracks" Burchett directed the base work.

Pavement Breakers Are Self-Contained

A new model of gasoline-powered pavement breaker and rock drill is announced by the Barco Mfg. Co., 1818 Winnemac Ave., Chicago 40, Ill. The Model H-6B is recommended by the company for heavy-duty pavement breaking, and is described as an entirely self-contained unit. Ignition is supplied by a 6-volt automobile-type storage battery; or a 9-volt dry-cell battery may be used. The unit weighs 94 pounds and is said to make between

1,150 and 1,550 strokes per minute.

A light-duty unit, the Model J-2, is also manufactured by Barco. This model weighs 78 pounds and is said to make between 1,250 and 1,550 strokes per minute. Both units are designed for portable use and can be carried on the running board of a pick-up truck, or fitted inside the trunk of a passenger car. Among the special tools available for use with these hammers aremoil points, asphalt cutters, tampers, ground-rod driving chucks, drills, frost wedges, spades, digging tools, chisels, gads, etc.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 92.

Gears Are Duplicated By Flame-Machining

Flame-machined heavy-duty sprockets and gears are now being produced from steel plates by the Cogmatic Co., Dept. CE, 757 N. Water St., Milwaukee 2, Wis. The Cogmatic process is designed to provide a means for the fast replacement of worn cast-iron or cast-steel sprockets and gears on construction machinery.

Cogmatic has developed a special machine whereby the blank to be cut is rotated on a spindle while an oxyacetylene cutting torch moves radially in respect to it. Movement of the cutting head is coordinated with the motion of a system of levers which follow the contour of a cam, the pattern of which reflects the tooth pattern. According

to Cogmatic, more than 5,000 types and sizes of sprockets and gears can be produced in this manner. The company points out that inasmuch as the teeth are flame-machined, no further machining or heat-treating is needed.

The flame-cutting equipment is presently available in sizes to handle diameters of 4 feet, with a 5-foot model presently available. A cutting thickness of 3 inches is now the maximum, but future plans call for cutting metals up to 6 inches thick. Sprockets are manufactured to fit all classes and pitches of roller chains, detachable link chains, pintle chains, and combination chains. Spur gears and ring gears of most types are also available. Standard products include sprockets up to 6-inch pitch, from 3 to 64 inches in outside diameter, and with 7 to 200 teeth; standard and special roller-chain sprockets from ½ to 2½ inches; gears in from 1 to 4 pitch diameters, from 3 to 64 inches in outside diameter, and with from 7 to 200 teeth.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 109.

Motorola Appoints Galvin

The appointment of Robert W. Galvin to the post of Executive Vice President is announced by Motorola, Inc. Mr. Galvin is 26 years old, and has been a Director of the company since 1945. He succeeds Joseph E. Galvin, co-founder of Galvin Mfg. Co., forerunner of Motorola, Inc., who died in 1944.

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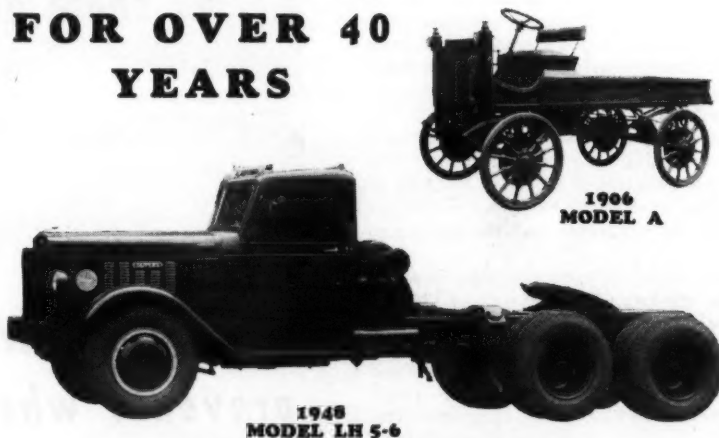
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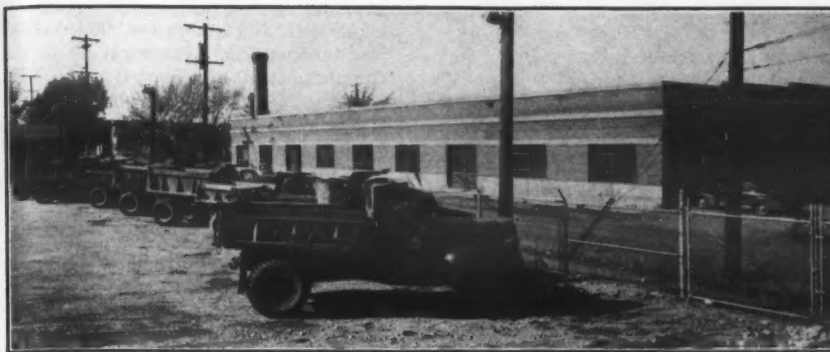
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Spokane County, Wash., has equipped its fleet of 27 trucks, which are parked outdoors every night, with Kim Hotstart engine pre-heaters. At right, W. E. Guenther, County Fleet Superintendent, demonstrates how drivers plug in the pre-heaters each night. A night watchman throws the main switch at midnight to give the entire fleet 7 hours of pre-heating.



Engine Pre-Heaters Lower Upkeep Costs

Outdoor storage of automotive equipment becomes an acute problem in winter months—expensive as well as inconvenient. Maintenance costs are increased; greater strain is placed upon batteries; it is necessary to use lower-viscosity oils than desirable to insure starting in cold weather; and, very often, equipment cannot be started at all without a push.

C. J. Chaffins, Engineer of Spokane County, Wash., was concerned over what he felt were unnecessary maintenance costs on 27 pieces of road equipment stored in this manner. He finally solved the problem by installing, in the entire fleet, engine pre-heaters made by the Kim Hotstart Mfg. Co. of Spokane, Wash.

He dismissed the idea of building a garage to house the equipment when cost estimates were compared with the sum required for wiring the lot and installing the 750-watt 110-volt pre-

heaters on each engine.

W. E. Guenther, County Fleet Superintendent, when interviewed on the operation of the Kim units after a year's use, was enthusiastic in his comments. When the equipment is located in its stall at night, he said, the driver connects the Hotstart plug in the engine to the post terminal. Moisture-proof electrical outlets are used throughout the system. The main switch is thrown by the night watchman at midnight, thus giving the entire fleet 7 hours of pre-heating at a maintained engine temperature of 130 degrees. Automatic time clocks were considered instead of the main switch, but the present system was continued because it was convenient and inexpensive; and the night watchman had to be on the job anyway.

Ohio Plant Is Expanded

The Marion Metal Products Co. has completed an addition to its Marion, Ohio, plant. The new addition is one

story in height and has a floor space of 26,000 square feet. It will provide quarters for the machine shop, the

plant superintendent, personnel offices, a new first-aid room, and an employee lunch room.



Full length view showing Flexible Outer Clamp Unit, inner rod, coupling and Pig Tail Anchor.

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3. Easily installed and removed, light to handle.
4. Will not slip, stretch or creep.
5. Leave no exposed ties nor rust streaks on finished surface.
6. Angularly adjustable for alignment.
7. Forms are held rigidly with a known factor of safety.
8. Time and material saved handling less steel.
9. The pigtail anchor rod saves steel and positively will not creep.
10. Rigtail anchors can be placed into concrete after pouring, within an hour's time, eliminating elaborate line-up and tying before pouring. This also makes it much easier to gauge centers.

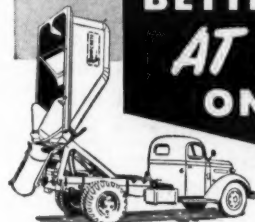
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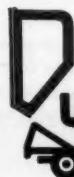
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M. R. Latimer of Denver is getting compliments on his low-cost Dumpcrete Concrete. He writes, "The city inspector says our concrete is superior to that mixed in transit."

Latimer mixes his air-entrained concrete at a central plant where the mix can be carefully controlled. "After a recent 13-mile, 35-minute haul," he reports, "concrete was well-graded and uniform, with no surface water on the load; and it could have been hauled a lot farther without segregation."

"Best of all," he continued, "our overall costs have been substantially reduced."

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Loader Attachment For Motor Graders

A front-end loader attachment for the Model 402 motor grader is announced by The Galion Iron Works & Mfg. Co., Galion, Ohio. According to the manufacturer, this combination makes it possible to windrow dirt or snow, scoop it up, and load it on trucks in one continuous operation. It can also be used in handling sand, cinders, and other material from and to stockpiles.

The lifting mechanism is hydraulically powered and is controlled from the operator's seat. The loaded bucket is tripped by a manual cable control. Operation of the loader attachment is independent of the scarifier. The standard bucket has a capacity of 9 cubic feet, and an extra-large bucket is available as desired. Maximum lifting height is 9 feet 10 inches; dumping clearance is 8 feet; and forward reach is 4 feet 6 inches.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 44.

Drafting Equipment For Use at Any Angle

Drafting machines and equipment for use in any position from vertical to horizontal is manufactured by the Emmert Mfg. Co. of Waynesboro, Pa. The machines are available for use with boards from 24 to 132 inches wide by any length. Special machines, including left-handed ones, can also be furnished according to the user's specifications. Among the features claimed for the Emmert equipment are complete coverage of the drawing board with no obstructions, and the use of one machine for drawing lines at any angle.

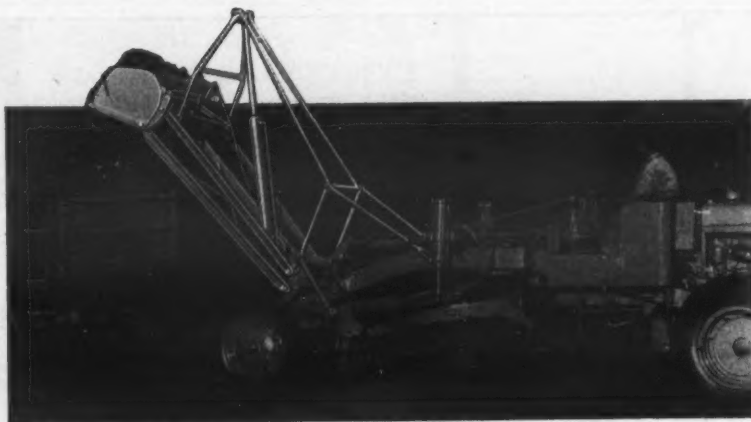
A micromatic quadrant is designed to provide an accuracy in angle measurement to $2\frac{1}{2}$ minutes. A special rapid-indexing mechanism permits a speedy change of angles. The track rollers are ball-bearing-mounted and are equipped with a lock to prevent motion during the drawing of long lines. A spiral spring counterbalances the machine as its angle of use is changed. The board contact rollers are made from a highly polished plastic to keep smudging down to a minimum.

Further information on this drafting equipment may be secured from the company, or by using the enclosed Request Card. Circle No. 115.

Sheet Piling, Wire Rope Described in New Folders

Two new catalogs have been made available by the L. B. Foster Co., P. O. Box 1647, Pittsburgh 30, Pa. Folder F-110A describes the line of lightweight interlocking corrugated-steel sheet piling. Bulletin F-109A covers the Foster line of standard wire rope and wire-rope slings. A 12-page inventory booklet accompanies the wire-rope brochure.

Folder F-110A features five cross-sectional views showing the dimensions of the Foster sections and how they are interlocked; the use of joints, crosses, tees, and wyes; dimensions and use of the driving head; standard formed inside and outside corners, and the pulling tongs; and the dimensions and



The new Galion front-end loader attachment, in combination with the Galion Model 402 motor grader, is designed to windrow dirt or snow, scoop it up, and load it on trucks in one continuous operation.

construction of short sections for exact-length walls. The folder also contains a table listing the physical characteristics of the sections, and text material on the features of the Foster equipment.

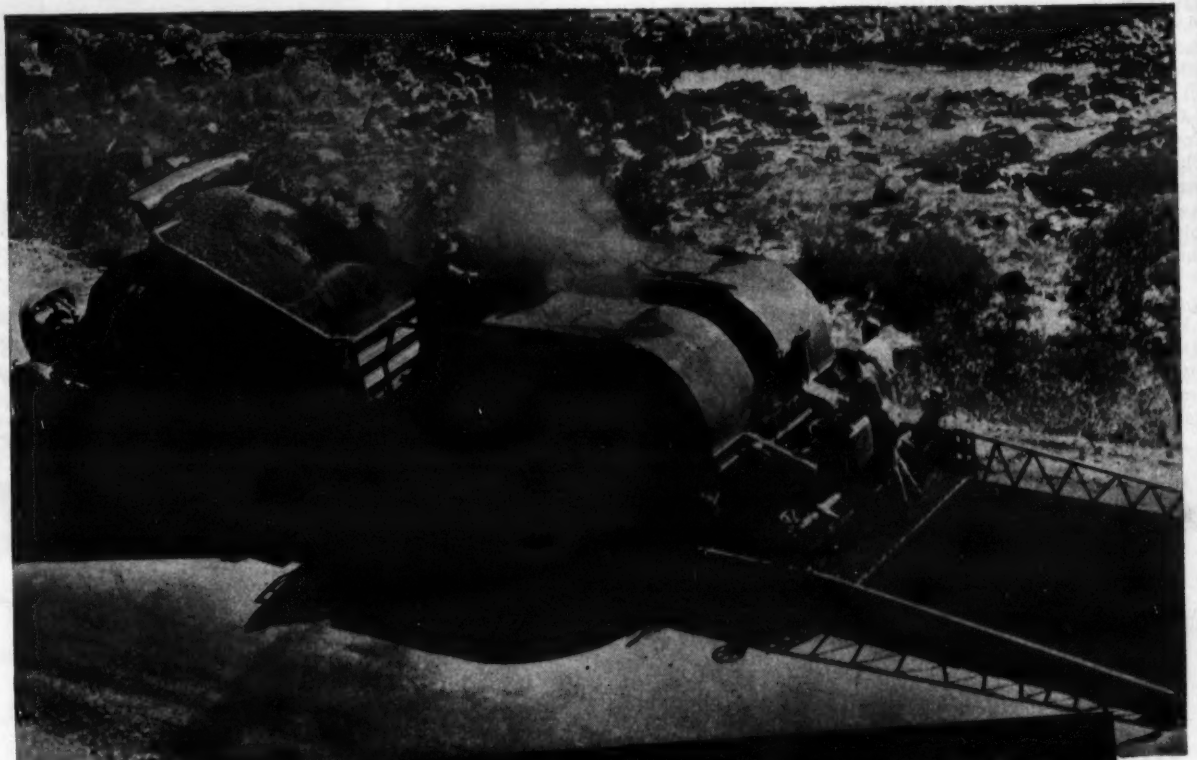
Folder F-109A describes the Foster line of wire rope, and shows cross-sectional views of the styles in which it is available. It covers the source of the wire rope and wire-rope slings,

available assortment, price, condition, inspection, and quantities. The inventory booklet accompanying it covers the complete stock. It lists type of construction, center core, finish, and grade, and tells whether the rope is preformed or standard. The wire rope is listed according to diameters. The lengths in which it is available are indicated after each style. The wire-rope slings are listed according to item number, quantity in stock, description and length, and unit price.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 112 for Bulletin F-110A and No. 113 for Bulletin F-109A.

Two Athey Appointments

Appointment of G. O. Britton as Domestic Sales Manager and E. B. Schlenk as District Representative has been announced by the Athey Products Corp. Mr. Schlenk will contact Athey-Caterpillar dealers in the Central Territory.



For Tough Mixing Jobs...The New Heavy-Duty Moto-Paver

For heavy bituminous mixing, retread and stabilization jobs—under the toughest kind of operating conditions—the new heavy duty Moto-Paver delivers dependable, low-cost performance.

Developed especially to meet the rugged conditions of hilly and mountainous terrain, this new and more powerful Moto-

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Based on design proven by three years successful operation of the standard model, the heavy duty Moto-Paver includes a larger 8-cylinder mixer engine, a larger belt-fed truck hopper and improved bitumen control as standard equipment. Windrow loader, heavy duty air cleaners, transfer pump and other optional equipment are available to meet special operating conditions.



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New Sewage Plant To Handle 420-MGD

(Continued from page 17)

will flow to Hyperion through two outfall sewers, the North and Central. These outfalls form a junction in the plant grounds prior to entering the plant proper. The North Outfall has a gravity capacity of 450 cfs, and the Central a capacity of 90 cfs. Storms will probably create a head which will boost this figure to a total of 650 cfs.

Flow Plan Complex

As the sewage flows through the plant, it first enters the headworks building, where coarse debris is removed by four automatically raked bar screens. Debris is then pumped into a launder back of the bar screens, and discharged into a forebay to be forced ahead to two 36-inch comminutors, where it is finely ground and returned to the main channel beyond the grit chambers.

Sand and grit are removed by three grit chambers, each 60 feet square. This material is pumped to grit washers, drained, and removed by trucks for fill.

All necessary chlorination will be done by six 6,000-pound chlorinators and accessories, at present in the temporary chlorination plant.

The sewage is then metered by two 108-inch Venturi meters, prior to flowing into the primary settling tanks, covered by a concrete slab. Here it receives about 30 minutes of pre-aeration, and is then distributed to eight covered settling tanks, each 300 feet long and 56½ feet wide. Normal detention period will be 1½ hours. Four underground sludge-pumping plants force all sludge to the digestion tanks.

Primary effluent flows up to a maximum of 650 cfs may be diverted from these tanks to a plant by-pass, or 540-cfs peak flow to aeration tanks, uncovered, where activated sludge is added and aeration takes place in 32 tanks, each 300 feet long x 30½ feet wide. Average detention period is 3.22 hours and application of air will average 0.51 cubic foot per gallon. Air requirements of the tanks will be 87,320 cfm.

Mixed liquid then flows to uncovered final settling tanks, where it is distributed to 20 tanks, each 125 feet long x 76 feet wide, with total weir lengths of 23,540 feet. Sludge is pumped from collection pits to the return activated channel, and flows to aeration tanks. Waste activated sludge is pumped from this channel to the head of the primary settling-tank unit. Final effluent, about 245 mgd, will flow to the surge chamber at the head of the new submarine outfall, then be discharged through multiple outlets one mile offshore.

All sludge is therefore collected in the primary settling-tank pits which are connected to the four underground pumping plants, and the grease skimmed from the tanks passes to two ejectors. This material is forced to the digestion system, consisting of the 18 tanks described in the companion article on page 17.

The tanks are arranged in three batteries of six tanks each, four primary and two secondary. Primary tanks will be maintained at 95 degrees by means of live steam produced by waste engine heat and introduced into the sludge as it enters the tanks. Supernatant will flow to the head of the pre-aeration tanks, and digested sludge to the elutriation system.

The elutriation system consists of two wash tanks and one concentration tank, each 200 feet long, 40 feet wide, and 14.5, 15.5, and 15.5 feet in depth, respectively. The system includes a battery of pumps for distribution of wash water and sludge.

Elutriated sludge from this unit is pumped to the filter, drier, and fertilizer storage system. Here sludge is chemically treated and filtered on 12

vacuum filters, each with an area of 570 square feet. The cake produced will be carried on conveyors to four driers. Each drier unit will evaporate 22,500 pounds of water per hour, and either dry the sludge to fertilizer with a moisture content not to exceed 10 per cent, or incinerate it to ash. Fuel will be digester gas, natural gas, oil, or combinations of all these. Vapors, gases, and foul air will be vented through an adjacent stack 200 feet in height. Storage capacity for 2,000 tons of fertilizer has been provided, and it is estimated that the plant will produce 220 tons of fertilizer a day.

Plant Power

Power will be supplied exclusively by the power plant, which will house nine supercharged dual-fuel diesel Worthington engines of 1,688 hp each, fueled with oil and digester gas. Engines are equipped with vapor-phase units and exhaust water heaters, from which heat is recovered for heating the digesters. Five of these engines will

be connected to generators, and four through step-up gears to centrifugal blowers of 40,000 cfm each.

Plant Badly Needed

When the plant is finished, it will cover an area about 3,300 feet long x 1,000 feet wide, or approximately 76 acres. The grounds will be suitably landscaped so that the plant will be neat and attractive from the outside.

The entire history of Los Angeles has been a tale of a city which grew too fast for its sewage-disposal facilities to keep pace. Only 25 years ago sewage still flowed from open manholes in the streets. Now, at a cost of \$41,000,000, Los Angeles is attempting to solve the problem for many years to come.

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LUDINGTON, MICHIGAN



Avoid Legal Pitfalls

Edited by A. L. H. STREET, Attorney-at-Law

These brief abstracts of court decisions may aid you. Local ordinances or state laws may alter conditions in your community. If in doubt consult your own attorney.

Case Brings Out Important Legal Aspects of State Road Contracts

Litigation begun 20 years or more ago over two Oklahoma highway projects was recently ended by a decision which the Oklahoma Supreme Court handed down. (State Highway Commission v. Green-Boots Construction Co., 187 Pac. 2d, 209.)

The State had paid more than \$432,000 to cover final estimates for the work, computed according to the terms of the contracts. The litigation concerned the contractor's right to \$155,576.44 to cover losses which he claimed he had sustained. The Highway Commission rejected the claims. But a trial court in Oklahoma City decided that the contractor was entitled to \$90,000, and it ordered allowance of that sum with interest. The Supreme Court, in turn, reversed the decision and ordered dismissal of the suit.

Arbitration of Extra-Work Claim

Three principal problems arose during the suit—the first over a standard clause in the contracts which called for arbitration of disputes over extras, etc. The contractor relied on this clause. However, a statute in Oklahoma required the State Highway Commission to audit all claims against a highway construction and maintenance fund.

The Supreme Court argued that the arbitration clause could not, therefore, be applied. For to give effect to it would mean allowing the Commission to delegate to arbitrators the performance of a duty which law imposed on the Commission itself.

Written Agreements Covering Extras

The contracts also provided that the contractor's claim for altered or extra work would be allowed only when a special written agreement covered that work. Consequently the Supreme Court ruled that the State Engineer could not waive the requirement for such written agreement, nor could the Commission allow such claim.

The court pointed out that both it and the South Dakota Supreme Court have decided there can be no recovery for extra work under state contracts unless the extra work is covered by special written agreement. The court adopted what the South Dakota court had said concerning a state bridge contract:

"It would have been a simple matter for the plaintiff [a contractor] to have agreed in writing with the commission for this extra work prior to the performance thereof. This provision of the contract is not an unreasonable provision, and we know of no reason why it should not be given effect."

The Oklahoma Supreme Court concluded that "the state engineer in charge of the work could not waive the requirements for prior written agreements . . . nor could the Highway Commission allow such items. It

was therefore the ministerial duty of the Commission to disallow that portion of the claim."

Suit Against the State

Nor could a court require the Commission to audit and allow claims for extra compensation for work and materials furnished without compliance with contract conditions. Since the Commission had disallowed the claim, a suit to enforce allowance was in effect a suit against the State for damages, declared the Supreme Court. Such suit must fail because the State had not consented to be sued.

Said the court: "Actions against state officers, who represent the State in action and liability, and in which the State, although not a party to the record, is the real party against which relief is sought and in which the judgement would operate to control the action of the State or subject it to liability or affect its property, are suits against the State which cannot be maintained without the consent of the State."

Where Soil Conditions Were Falsely Stated

THE PROBLEM: A sanitary district induced a contractor to take on a sewer job by concealing, in soil-condition information furnished the contracting company, the true condition as disclosed by test-boring records in the district's possession. The company was thereby misled to believe that the work could be done by the free-air method. The withheld information disclosed that compressed air would have to be used on part of the job.

In the company's suit for reimbursement against additional costs and damages caused by the fraud: (1) Was the district properly held to the same standards of honesty as if it had been a private corporation or an individual? (2) Could the district escape liability because the bidding specifications required the company to make its own test of soil conditions? (3) Was the district exonerated from liability because the claim for additional costs and damages was not filed within a time limited by the contract for filing claims?

THE ANSWERS: (1) Yes, (2) No, (3) No. (Illinois Appellate Court, First District; McKay Engineering & Construction Co. v. Sanitary District of Chicago, 81 N. E. 2d 268.)

The court ruled: That the contracting company had a right to show that before the bids were opened the district had made an estimate of the cost based upon the information withheld from the company; that the

district's misrepresentation did not constitute such mere expression of opinion as would have fallen short of showing fraud. The clause in the contract limiting the time for filing claims should be read as meaning claims based on grounds not involving fraud on the district's part. And the 5-year period allowed for bringing the suit did not commence to run until the company discovered the fraudulent concealment.

Contractor Claims Extras

THE PROBLEM: Was a Government highway contractor working on a unit basis entitled to payment of claims as follows: (1) For obliterating an old road not covered by the bidding proceedings? (2) For moving rock at a false cut and hauling earth to dress the slope of the cut when it appeared that that

(Concluded on next page)

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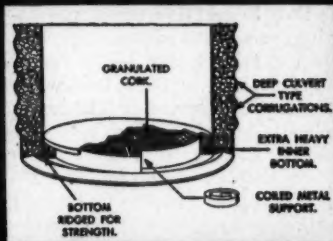
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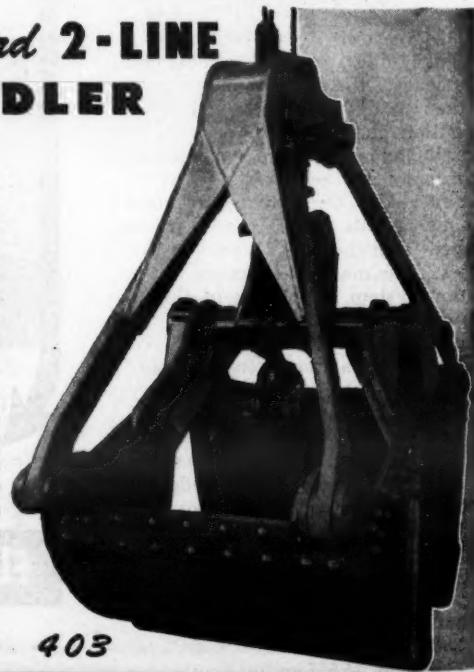
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Avoid Legal Pitfalls

(Continued from preceding page)

work was incidental to doing contract work? (3) For the use of a power shovel and operator to load surplus crushed stone on trucks for haulage to points where used—the project engineer having permitted the contractor to stockpile more stone than was later paid for? (4) For replacing the stone surface on the highway after its completion but before final acceptance? The work was necessitated by subgrade dirt spewing up and was not due to fault of the contractor. (5) For burning stump pile that the engineer permitted the contractor to accumulate on private property adjacent to the highway during clearing operations?

THE ANSWERS: (1) Yes. The work of obliterating the old road, so far as not obliterated in building the new one, was not covered by the specifications and involved hand labor. (2) No. (3) No. (4) Yes. (5) No. Burning the stump pile was an incident of the contractor's obligation to clear and grub the site, for which he was paid. (First-Citizens Bank &

Trust Co. v. United States, 76 Fed. Supp. 250, decided by the United States Court of Claims.)

Child Dies in Quarry Pond; Contractor Is Not Liable

THE PROBLEM: Was a construction company liable when a nine-year-old boy drowned in an artificial pond created by the company in quarrying rock and gravel on its own premises?

THE ANSWER: No, decided the Virginia Supreme Court of Appeals. (Washabaugh v. Northern Virginia Construction Co., 48 S. E. 2d 276.)

The company continued to use the pit for the removal of rock and gravel, and the court rejected a contention that the company, after knowing that children were wading or swimming in the pond, became bound to maintain barricades and post warning signs. The court said that the pond created no more peril to children than if it had been a natural pond.

"The primary duty to inform, advise, and protect a child against such natural, open, and obvious dangers is upon the parents and not upon strangers. To require the proprietor of such a business enterprise to erect a fence or barricade around a pond and across a private road, of such a character that it would prevent adventurous youth from entering, would impose such a burden

that would unduly interfere with the lawful use of the property. . . Such danger is natural, open, and obvious, and is ordinarily encountered in most places where children gather to wade or swim."

The court cited similar conclusions by appellate courts in California and Minnesota.

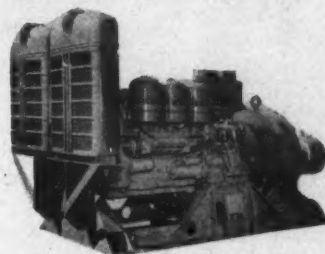
Government's Indecision Became Breach of Contract

THE PROBLEM: A contractor was delayed 50 days by the Government's prolonged deliberations on whether or not to exercise a reserved right to change plans. Did that constitute such breach of contract by the Government as to entitle the contractor to damages?

THE ANSWER: Yes, decided the United States Court of Claims. (Anthony P. Miller, Inc., v. United States, 77 Fed. Supp. 209.) Said the Court of Claims:

"In the circumstances, the Government's conduct was a breach of contract. It had, in the contract, reserved the right to make changes, but a sensible reading of that provision does not give it the right to deliberate, in disregard of the interests of the other party to the contract, for as long as it pleases, upon changes so fundamental that the work can go forward only haltingly and uneconomically until the deliberations are concluded."

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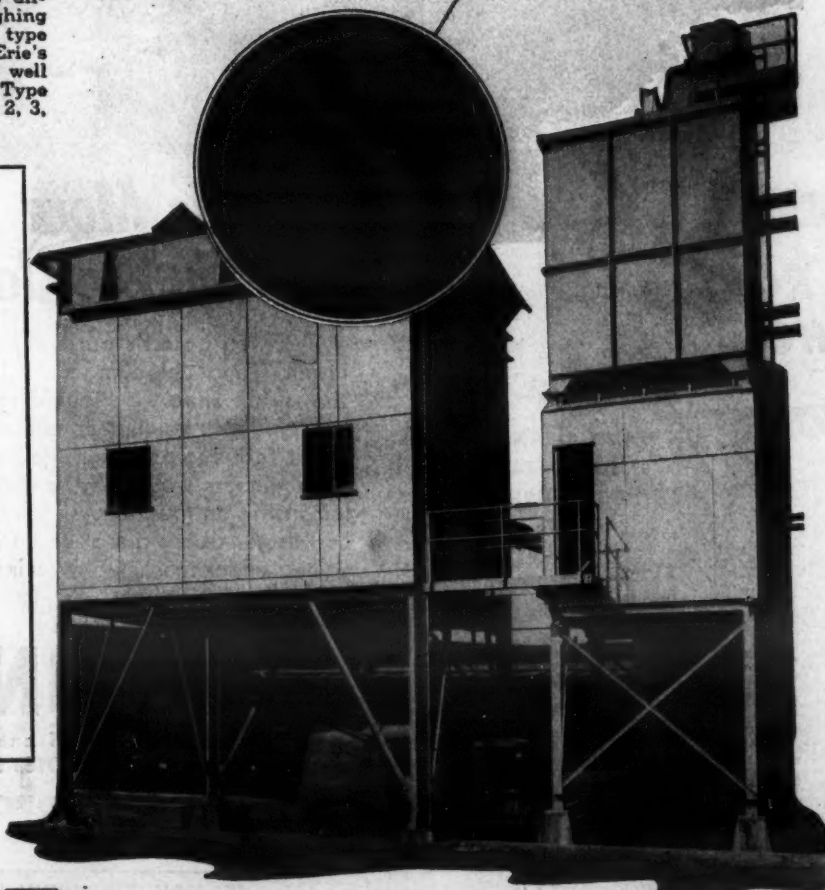
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The Iron Tireman for removing and mounting truck tires does away with manual lifting—and strained backs.

Tire-Mounting Device

A device to simplify mounting and dismounting of truck tires is announced by Coats Loaders & Stackers, Inc., Fort Dodge, Iowa. The Iron Tireman is designed to eliminate manual lifting in mounting and other tire-handling operations. To mount tires, the stand is tipped forward onto rollers built into the base, the center post is threaded through the hub opening, and the tool is then tipped back into position.

In dismounting tires, the tool utilizes natural tire stretch plus controlled leverage, the company explains. The center post telescopes in order to provide added leverage. After the tire is removed, the tool is pitched forward onto the rollers and backed away from the tire and rim.

The Iron Tireman is said to speed and simplify lock-ring removal and replacement. Safety hold-down bars, which prevent lock rings from flying free, are standard equipment. The tool adjusts from 20 to 24 inches and handles

Budd-type wheels with hub openings of from 4 to 10 inches. It also handles demountable rim types from 20 to 24 inches, and 17-inch semi-drop center rims.

Further information may be secured from Jack P. Hennessy Sales Co., National Sales Representative, P.O. Box 111, Audubon Station, New York 32, N. Y. Or use the enclosed Request Card. Circle No. 121.

Form-Clamp Devices

A line of form clamps and related accessories is manufactured by W. J. Burke & Co., Inc., 2690 Harrison Ave., San Francisco, Calif. The Burke clamp (she-bolt) is adjustable for walls from two to twelve inches without change of the full-threaded two-inch inner-tie rod. Cones used with the clamp are hollow, eliminating the usual externally threaded "he-bolt." The clamp can be used with or without cones, using the same "she-bolt" wale rods. Each wale rod is tapered for 6 inches to eliminate spalling and for easier removal.

The line includes adjustable metal screed supports, button clamps for use with pencil rod, rod pullers, steel couplings, external spacer locks, and similar items.

District offices are in Los Angeles and Seattle. Further information on these products may be secured from the company, or by using the enclosed Request Card. Circle No. 56.

Surveyors' Tapes and Tools

Measuring tapes and other surveying aids are described in a 55-page catalog issued by the Keuffel & Esser Co., Adams & 3rd St., Hoboken, N. J. These surveyor's tools include steel and woven tapes, pocket tapes, band chains,

reels for chains, topographic tapes, Abney levels, city engineers' tapes, tension handles, pocket thermometers, tape-mending equipment, plumb bobs, targets, stake tacks and arrows, etc.

The catalog points out the features of the K & E line, and lists the sizes in which each unit is manufactured. It describes the calibrations on each tool,

the degree of accuracy obtained with each, and other features of construction and use. Also discussed is the material from which each is made, and the degree of accuracy maintained by K & E during construction processes.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 108.

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Boysen Dam Started; A Link in Vast Plan

(Continued from page 2)

original Boysen Dam has been blown up: destroyed completely. But in its place there is destined soon to rise a new, much bigger Boysen Dam—an earth-fill barrier which will back the Big Horn River up beyond the head of the canyon, and which will complement engineering works already completed in the big Riverton Reclamation Project.

Power again is the primary objective: 15,000 kva. But, the present dam will have deeper significance. The power output will fluctuate somewhat as the reservoir aids flood control on the Big Horn, the Yellowstone, and the Missouri Rivers. Some of the water stored behind the dam will be used to irrigate dry acres in the Riverton Reclamation Project.

The dam is only a link in the vast Pick-Sloan plan for the basin-wide development of the Missouri River; 105 such dams and reservoirs are contemplated. Boysen is one of the first on the list to be built because of a power shortage in central Wyoming, and also because the Yellowstone is perhaps the most troublesome tributary of the Missouri River. Kortes Dam is also under way only 100 miles from Boysen.

Bureau of Reclamation Job

Boysen Dam was designed and is being built under the supervision of civilian engineers of the U. S. Bureau of Reclamation. The joint-venture firm of contractors on the initial \$13,899,999 contract includes the sponsor, Morrison-Knudsen Co., Inc., with Peter Kiewit Sons Co., Raymond

Concrete Pile Co., General Construction Co., The Shea Co., F&S Contracting Co., and S. Birch & Sons Construction Co.

The initial contract calls for construction of the new dam, excavation and structure work in the spillway, construction of the power plant except for installation of generators and allied equipment, and the relocation of about 14.5 miles of C. B. & Q. railroad track including about 1.25 miles of tunnel construction.

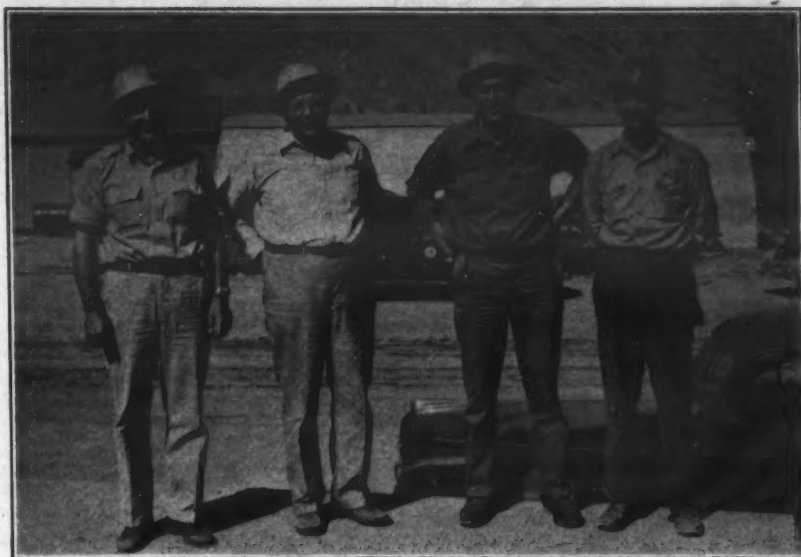
Extensive subcontracts have been let, one to Gibbons & Reed of Salt Lake City for earth work in the railroad embankment; the other to Royce Kershaw for ballast, ties, and track work on the railroad. The rest of the principal work items are being done by the prime contractors.

The big job was started in September, 1947, and is not slated for final completion until the end of the 1951 work season. Work on the railroad and tunnels is detailed in the companion articles. As for the dam itself, work during the 1948 season included some minor stripping and preparation for stream diversion, excavation of the spillway and outlet diversion tunnel, and some excavation and stripping near the site of the powerhouse.

Dam Details

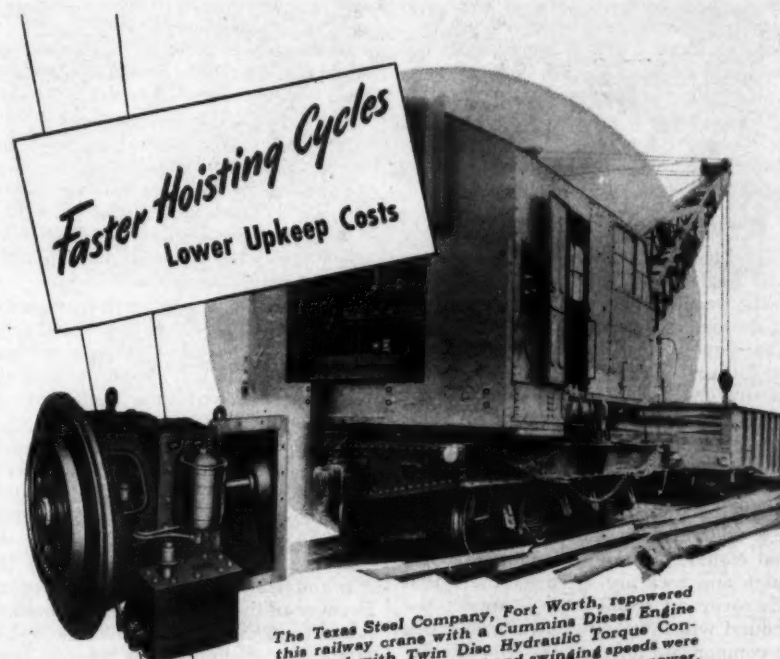
Boysen Dam is to be located about a mile upstream from the original structure, reportedly because of the difficulty of relocating the Burlington railroad through the narrow canyon. It will be a rolled-earth-fill structure rising 150 feet above the riverbed and 1,100 feet long at its crest. An open chute-type spillway on the right abut-

(Continued on next page)



C. & E. M. Photo

Left to right are Barney Folkner, USRR Field Engineer; A. V. Toolson, Superintendent for Gibbons & Reed; Harold Buckert, Morrison-Knudsen's General Superintendent; and Harold Maxwell, M-K's Tunnel Superintendent.



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Power Take-off



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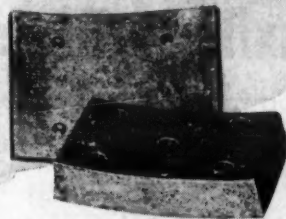
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Boysen Dam Started; A Link in Vast Plan

(Continued from preceding page)

ment will permit excess floodwaters to escape in abnormal floods, but ordinarily the river will flow through penstocks to the powerhouse below the dam on the right abutment near the spillway.

Initial diversion of the river is to be accomplished by a 28-foot round tunnel bored through solid rock directly under the spillway. As plans now stand, this tunnel will be plugged with concrete after the river starts flowing through the powerhouse. The present Burlington Railroad tunnel will be used to carry the penstocks under the right abutment to the powerhouse.

To key the dam to rock and reduce seepage to a minimum, a cut-off trench will be excavated in rock, and there will be a concrete cut-off wall extending from several feet in the rock up to the impervious zone of the dam.

The earth-fill portion of the dam will have three main zones. Zone 1 is to be impervious selected sand, gravel, and clay rolled in 6-inch lifts to 95 per cent density. Zone 2 will be a semi-pervious selected sand, silt, and gravel, combined with durable rock fines wherever found. This will also be watered, processed, and rolled down in 6-inch lifts. Zone 3 will be rock fill, graded in coarseness towards the outer slopes.

Peculiar Geology Is Headache

The biggest headache to contractors and Reclamation men alike at Boysen is the peculiar nature of the formations at the dam site. Only 20 miles away at Thermopolis, hot mineral waters boil up through faulted, broken parts of the earth's crust. One of these big springs flows nearly 1,000,000 gallons an hour at a temperature of 165 degrees. For years prior to 1809 it was a health mecca for Indians and white pioneers.

This peculiar broken, crusted formation extends for many miles around and includes the Boysen dam site. The earth and rock are so tricky there that wherever an excavation is made, the ground will invariably crawl and creep to compensate for the loss. Hardly any phase of the job has been carried out thus far without Mother Nature taking a hand in the matter too. Change orders and extra contract items have resulted, to compensate for the unforeseen conditions which have arisen.

In general, most of the rock at the dam site is broken sandstone. There is, however, some hard siltstone, some limestone, and some diorite. This last rock is hard enough to dull a drill bit in 6 inches of travel, while much rock of the other types will slide at the least provocation.

Spillway Excavation

One of the tough jobs to be done early in the project was the excavation of spillway rock, which also included the facing-off excavation for the outlet tube under the spillway. There, where some of the hardest material of the job was to be removed, the contractors brought in their heavy-duty excavating machines.

Compressed air for the drilling equipment was piped by steel headers from the tunnel compressor houses, where two Ingersoll-Rand 2,500-cfm machines are located. Drilling equipment consisted of 3 Ingersoll-Rand wagon drills and 10 Ingersoll-Rand Jackhammers of the 55-pound class. Series 15 Ingersoll-Rand stud bits were used, with 14-foot-maximum wagon-drill steel and 8-foot-maximum Jackhammer steel.

Drilling and blasting was under the supervision of George Backley, a veteran driller who worked for Dam builder Frank Crowe 40 years ago at Arrowrock Dam, and who has since worked on many other dam projects. According to this wise old veteran of many a shot, the rock at Boysen is particularly seamy, some of it is hard, and its drilling and shooting characteristics vary greatly.

For example, wagon-drill footage will vary in a space of 50 feet. In diorite, 100 feet in 8 hours of drilling per machine is good. In soft sandstone or shale, the machines will turn in four times that amount very easily.

The spillway rock was drilled on a 4-foot grid pattern, and the holes were then loaded with 40 per cent gelatin-type powder on an average blasting ratio of $\frac{1}{2}$ pound of powder to the cubic yard. About 1,700 holes was the maximum amount set off at one time. Because of the tricky ground formation, it was quite impossible, of course, to attempt any springing. A 220-volt light circuit was used to set off the No. 6 electric blasting exploders, one of which was used in each hole.

The broken rock was then mucked out by a 54-B Bucyrus-Erie power shovel, which loaded the material to

five end-dump Euclids. Some of the excavated material was then wasted less than 2,000 feet away to build up a main shop area, part was dumped along the Big Horn River bank, and some was temporarily stockpiled for riprap purposes to protect the main dam from wave action after it is finished.

A Caterpillar D8 mounted bulldozer also worked around the equipment. It cleaned up the area near the shovel, occasionally helped to move wagon drills, and maintained a short road out to the main haul roads.

The spillway excavation, of course, (Concluded on next page)

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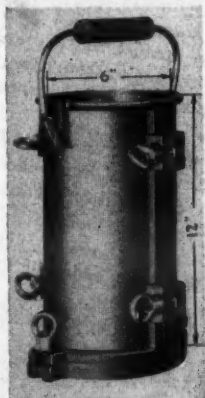
These are only a few of the many advantages found in the Littleford "Spray Master" Pressure Distributors. For further details write



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went down in cuts to coincide with the length of steel until bottom grade was reached. Just below the spillway crest, plans called for a rock slope of 1½ to 1. A sizable rock slide which occurred will in all likelihood now call for extra concrete in the spillway ogee. The spillway work proceeded 8 hours a day, and 42,000 cubic yards were removed during the peak month in the summer of 1948.

Haul Roads Good

It has been said that casual visitors can tell a Morrison-Knudsen job by the excellence of its haul roads, and Boysen Dam is no exception. Smooth, wide, all-weather haul roads maintained day and night by motor graders and a water-tank truck carry the rubber-tired hauling equipment. Polished regularly to be safe and smooth at high speed, these roads minimize tire wear and frame shock, and eliminate much down time.

One of the first things to be considered in pioneering any new part of excavation is the location of a haul road. Neither Project Manager Woody Williams nor General Superintendent Harold Buckert will permit equipment to move in without first seeing that the proper haul roads are built.

Equipment Maintenance Shop

A shop which is unusually well equipped with new lathes and other machines is one of the features of the main Boysen Dam camp. In this shop, where the master mechanic has his headquarters, are handled all manner of repairs and replacement of parts. It is also a central manufacturing plant, where the D8 Caterpillar tractors have been altered for tunnel mucking and the muck shovels made and installed.

The shop building is a 50 x 100-foot steel Quonset hut with a concrete floor. Ample parking space outside also permits mechanics to work out of doors near the shop.

In addition to the routine replacement of standard parts, the shop is frequently called upon to turn out special jobs. These range from making a spare set of fine drive gears on the big searchlight which illuminates the work area at night, to turning out all the machined parts on the mucking machines. All form bolts and ties for concrete work on the railroad-bridge piers are also turned out of this shop.

Principal items of equipment, in addition



Photo, Courtesy of John R. Barry, Morrison-Knudsen Co., Inc.
In the first-aid room of the hospital set up at the Boysen Dam job, Nurse Bruce treats a mashed thumb.

tion to small and heavy-duty tools, are:

- 1 Van Norman Model 26 milling machine
- 1 P&H welding machine
- 1 Ohio shaper
- 1 Oster pipe master
- 1 LeBlond 15-inch lathe
- 1 LeBlond 27-inch lathe
- 1 Stanley grinding machine
- 1 Carlton radial drill press
- 1 Kalamazoo metal-cutting saw
- 1 Canedy-Otto 21-inch drill
- 1 Hill Acme screw threader

The camp area is also situated in the main yard, with the exception of permanent employees' quarters which are located 12 miles away in the town of Shoshoni, Wyo. The camp area at the dam includes a number of Quonset huts which house an administration building, warehouses, a mess hall, electric shop, plumbing shop, and carpenter shop. Headquarters of the subcontractors are also located close to the main camp.

Batch Plant

This year, when railroad-tunnel lining and spillway concreting get actively under way, the big Noble 350-ton fully automatic batch plant will be operating at its capacity. Only the first few invert pours for the tunnel had been made when the project was visited.

The concreting plant also includes a Noble 600-barrel bulk-cement storage silo, and a 4-cubic-yard Koehring tilting concrete mixer mounted just below the batch-plant discharge chute. Certain field changes have made the plant

somewhat more accessible. All the controls were moved to the scale side of the plant to permit the operator to see all controls, all instruments, the water supply, the area below the open-grill operating platform, and the inside of the mixer.

Even the big Koehring mixer can be controlled and stopped at any point of dumping, through a "Joe McGee" 4-way air valve set-up. Thus, in special cases, only a part of the mixer load need be emptied to agitators hauling to the jobs.

Mixing water enters the plant through a 6-inch pipe line laid from the well at the Bureau of Reclamation camp high over the right abutment in the mountains. No provision has thus far been made to cool this water, and in summer it comes to the plant at temperatures over 100 degrees.

Aggregates for the concrete will be produced on the job, and the concrete set-up will be detailed in a later article.

Personnel

The job was designed and is being

generally supervised by L. N. McClellan, Chief Engineer of the USBR at Denver, with Kenneth F. Vernon at Billings, Mont., as Regional Director. Russel Lieurance is Project Engineer for the USBR and Barney Felkner is Field Engineer.

The contractors' key organization is headed by B. Woody Williams, veteran M-K dam builder who studied the game under Frank Crowe, one of the greatest dam builders of all time. Woody Williams is also Project Manager of Kortes Dam, 100 miles away, and divides his time between both jobs.

General Superintendent Harold Buckert is handling all field supervision at Boysen Dam, and in his quiet, capable way is conducting the job somewhat ahead of schedule. John Barry is the Project Engineer. Superintendents under Harold Buckert include Harold Maxwell on tunnels; Owen Daly on excavation in the spillway; Jim Rafferty on carpenter work; and Carl Whetstone on electrical work. Rod Gutru is Office Manager.

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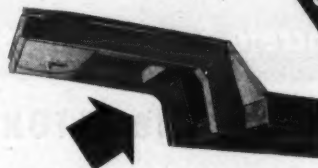
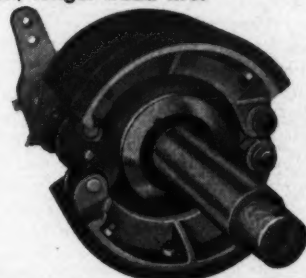


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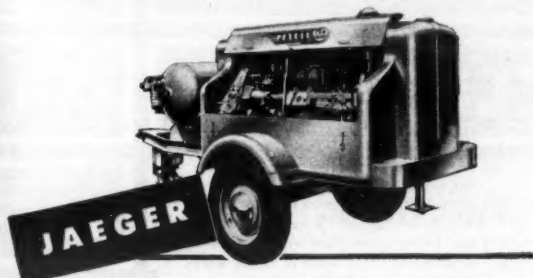
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A Sedgwick-developed double hitch to make parking easy and prevent jackknifing is a feature of the Wheel-O-Matic trailer.

Light-Duty Trailer

A light-duty 2-wheel trailer manufactured by the Sedgwick Machine Works, Poughkeepsie, N.Y., is designed to carry loads up to 1,000 pounds at speeds up to 65 mph. The body is 60 inches long, 42 inches wide, and 12 inches deep. It has an empty weight of 300 pounds.

Features claimed for the Wheel-O-Matic trailer include a Sedgwick-developed double hitch to make parking easy and to prevent jackknifing; and a floating-wheel assembly to eliminate wheel shimmy and assure level loads. The trailer has four corner post sockets for a rack body or canopy top. Standard equipment furnished with the Wheel-O-Matic includes universal-type couplings with emergency chains, two reflectors and a tail light, a set of tires and tubes, and cleats for lashing loads.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 48.

Plastic Safety Hat

A new plastic-molded safety hat is announced by the E. D. Bullard Co., 275 Eighth St., San Francisco 3, Calif. The new Hard Boiled hat is made up, the manufacturer explains, of thousands of continuous reinforcements of long interlocked fibers, impregnated and bonded with a resinous binder. The hat is designed to be resilient, waterproof, and non-conducting.

The hat has an adjustable sweat band to provide fits between sizes 6½ to 7½, and an adjustable hammock. Both hammock and sweat band can be adjusted without removal from the hat. Wedge-type hangers permit instant removal of the hammock-sweatband assembly and replacement with a new one as a sani-

tation measure, or when reissuing the crown to a new worker. Accessories available for use with the Hard Boiled hat include lamp brackets, chin straps, and winter liners.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 99.

Motor-Driven Table For Positioning Work

A work positioner to speed welding, hard-surfacing, assembling, repairing, grinding, and similar operations is announced by the Ransome Machinery Co., a subsidiary of the Worthington Pump & Machinery Corp., Dunellen, N. J. According to the manufacturer, this device speeds these operations by permitting the work to be shifted into the most convenient position for each operation.

The Ransome work positioner is driven by a ½-hp single-phase ac motor through a variable-speed hydraulic transmission. The table top of the Model I-P rotates through 360 degrees at speeds of from 0 to 5 rpm. It can be tilted manually through 135 degrees and can be locked at any degree of tilt by means of a worm-and-segment lock. The Model I-P has a load capacity of 100 pounds.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 78.

Trailer-Mounted Rig Atomizes Weed Killer

A trailer-mounted rig for spraying weed killers and other liquids is made by The Lawrence Aero-Mist Sprayer Co., 58 Federal St., Greenfield, Mass. The sprayer is designed to atomize the solution so that it filters down past obstructions and eddies out in all directions to provide complete ground coverage. Because of this coverage, the manufacturer points out, only one pass of the equipment is needed.

The Aero-Mist sprayer is powered by a 31.8-hp Novo gasoline engine. The spray tank has a capacity of 47 gallons, and the spray-solution pump provides continuous operation at a pressure of 40 pounds. The sprayer is mounted on a turntable which permits it to be revolved through 360 degrees even while the rig is in motion; a wheel control permits it to be adjusted in the vertical

plane. The fan of the blower, which is designed to operate at 3,600 rpm, is dynamically and statically balanced. The blades are part of the blower casting.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 86.

Cement Firm Ups Peyton

Charles L. Peyton has been appointed District Sales Manager by the Universal Atlas Cement Co., a subsidiary of United States Steel Corp. He is assigned to the Illinois-Wisconsin district.

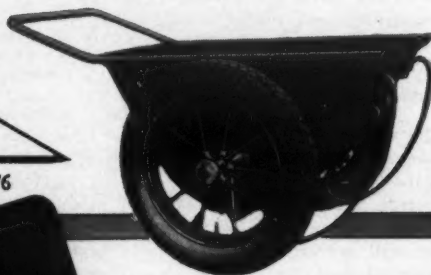


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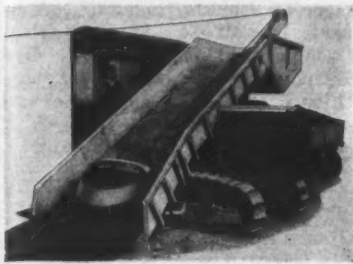
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Here is a front view of the Sauerman scraper-loader. It is built in four models with hp ratings from 32 to 78.

Drag Scraper, Loader Combined in One Unit

A combination drag scraper and loader is manufactured by Sauerman Bros., Inc., 522 S. Clinton St., Chicago, Ill. This self-propelled unit is recommended by the company for use in grading river banks, canals, and ditches; for large-scale excavation; for loading material from pits, banks, or stockpiles directly into trucks; for excavating sand or gravel and delivering to a portable crushing and screening plant; and other applications which require the services of a drag scraper and loader.

The Sauerman scraper-loader is crawler-mounted and gasoline-powered. It is built in four models with horsepower ratings of 32, 45, 66, and 78. Working ranges of these four machines are 200, 300, 300, and 400 feet. Sizes of the scrapers are $\frac{1}{2}$, $\frac{3}{4}$, 1, and $1\frac{1}{2}$ cubic yards. All four units travel under their own power at speeds up to 88 fpm. Controlled dumping is obtained by means of the long chute into which the drag scraper is pulled. This chute guides the scraper and holds it firmly during discharging operations.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 83.

Program for Raising Engineers' Salaries

A program to upgrade engineering personnel and raise salaries was discussed by R. P. Ellison, Executive Assistant of the Virginia Department of Highways in a report to the American Road Builders' Association last July. In his report, Mr. Ellison also cited a fourteen-point program to be followed in solving the current shortage of trained engineering personnel. It includes glamorizing and publicizing the engineering profession, increasing the salaries and the morale of those already engaged in engineering, and

promoting increased interest of engineering students in highway work.

Virginia, he said, found itself losing a large percentage of its trained highway men during the war. Many of its young engineers left to join the armed forces and its veteran employees left to take higher-paying war jobs in industry. The Department was without adequate means to hold these men, he said, or to induce new men to enter the highway profession.

Accordingly, the problem was presented to the State Director of Personnel, the Governor, and the State Legislature. And upgrading was approved with salary increases in line with other state highway departments and with the salaries paid for similar work in private industry. This helped to hold some of the state's good men and to recruit new engineering personnel. However, at the end of the war, when the Department faced a large construction program, the loss in personnel was still better than 67 per cent.

The matter was again presented to the Governor and the State Personnel Director at the end of the war, with emphasis on the following reasons for the desired further upgrading: (1) The assignments of highway engineers have increased in volume, importance, and difficulty, it was pointed out, and require absolute accuracy and rapidity. (2) Highway-department personnel must therefore be the best that can be secured, (3) and it should be able to maintain a decent and comfortable living standard. (4) Poor help is the most expensive help of all, (5) but unless departments can secure their share of ambitious college graduates, they are forced to use men of less ability. This can result in a great economic waste. (7) Moreover, salaries should be upgraded so that agency heads will not grant merit increases merely to meet increased living costs, diminishing the value of the merit system for the advancement of the best qualified employees.

After reviewing the arguments, supporting data, and recommended salary ranges, the Governor of Virginia approved a new schedule: Chief Engineer, \$8,000 to \$8,700; Division Heads, \$6,500 to \$7,500; District Engineers, \$5,500 to \$6,500; Resident Engineers, \$4,200 to \$5,200; Senior Inspectors and Chiefs of Party, \$3,200 to \$4,000; Junior Inspectors, \$2,400 to \$3,000. Graduate civil-engineering trainees in Virginia now start at \$250 per month and are given six months of training in each phase of highway work. An increase in salary comes with the completion of each six

months of work until they have been promoted to a salary of \$4,000 as Assistant Resident Engineers. Resident Engineers are then selected from this group of men.

Along with approval of this schedule, the Personnel Director and the Governor also assured the Department that they would do all in their power to see that salaries are kept in ranges that

will secure and hold engineers with initiative and ability.

Mr. Ellison said that he felt that, for the present, 75 per cent of the personnel problem in the Virginia Department is solved. And, he added, "This has not come about by sitting idle and asking others to help us. It has meant the cooperative efforts of all our administrators . . ."

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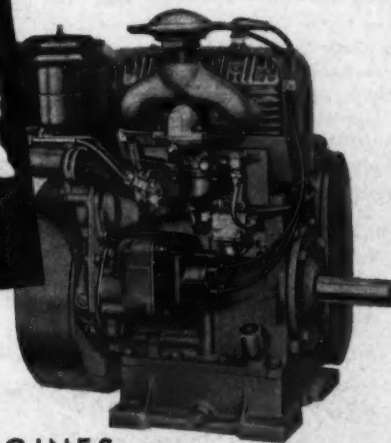
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Distributor Doings

Dealer-Sponsored Caravan For Field Demonstrations

A traveling exhibit of construction equipment is sponsored by the H. W. Lewis Equipment Co. of San Antonio, Texas. Its purpose is to show the operation and advantages of modern equipment by means of actual work demonstrations. The company is also prepared to recommend equipment combinations for various problems encountered in light construction and maintenance, and for various budgets.

Equipment in the Lewis Caravan includes an Allis-Chalmers BD-2 motor grader and an HD-5G Tractor-Shovel, Jahn tilt-loading trailer, Gar Wood 3-yard scraper, Allis-Chalmers Model W patrol and loader, Pierce Bear tandem roller and trailer, Davey utility power wagon—which combines a compressor, welder, electric generator, and floodlight—and a Tractomotive tractor loader.

Pow-r-Wheel Dealers Needed

National distribution plans for the Pow-r-Wheel barrow are being made by C. G. Schulze Co., Inc., of Burbank, Calif. The company states that several territories are still open, and it would like to hear from interested dealers. The Pow-r-Wheel barrow has a capacity of 10 cubic feet or 1,000 pounds and is powered by a 3-hp single-cylinder engine. The barrow body is quickly interchangeable with a flat-bed body.

Interested dealers should apply directly to the company at 2530 N. Naomi St., in Burbank.

Open House for Mich. Dealer

More than 1,000 visitors turned out for a party to celebrate the opening of a new headquarters building for the Michigan Tractor & Machinery Co. The new plant is located at 13801 Lyndon, Detroit, Mich. The festivities included a buffet luncheon, vaudeville acts, and a demonstration of construction equipment in action.

Equipment handled by the company includes Caterpillar tractors, diesel engines, and earth-moving equipment;

Athey Force-Feed Loaders; Case tractors; Link-Belt shovels and cranes; Hyster winches; Iowa Mfg. Co.'s Cedarapids line of gravel plants and crushers; Marlow pumps; Etnyre distributors; Roto Wing snow plows; and A. Leschen & Sons wire rope. Principals of the company are J. A. "Jack" Frost, President; Harry Armstrong, Vice President and Sales Manager; and Thomas Pinney, Secretary-Treasurer.

Distributor in Oregon

The Casey Tractor & Equipment Co. of Portland, Oreg., announces its appointment as state distributor for the Maginnis Power Tool Co. of Mansfield, Ohio, and the Instantsteam steam cleaner made by the Thermek Engineering Corp., of San Francisco, Calif. Casey also handles the Feedmatic saw made by the Victor Engineering Corp. of Philadelphia; Walker-Turner metal and woodworking equipment; and the Skilsaw line of power hand tools. The Casey office and showroom is located at 17 S. E. Union Ave.

Davey Names Two Dealers

The appointment of two dealers is announced by the Davey Compressor Co. M. C. Burt Equipment Co., 2018 Clinton St., Rockford, Ill., will serve that portion of the state of Illinois immediately surrounding Rockford, bounded on the south by the counties of Rock Island, Henry, Bureau, LaSalle, and Grundy. Thurston Cooke Equipment Co., Louisville, will cover the entire state of Kentucky. Both dealers will handle the complete Davey line, including air compressors, generators, mobile machine shops, power take-offs, etc.

Eugene, Oreg., Sales Plant

A new plant has been opened at Eugene, Oreg., by the Loggers & Contractors Machinery Co. It is located at Fillmore St. and Fifth Ave., and is on a plot of ground covering 53,200 square feet. The Eugene plant contains a display room, offices, parts department,

and a fully equipped shop. The company's main office is in Portland, Oreg., and another branch at Klamath Falls.

Equipment handled by Loggers & Contractors Machinery Co. includes Archer concrete-placing towers; Bada earth drills; Buckeye ditchers; Chain Belt Rex mixers, pumps, pavers, and

Pumperete; Cletrac tractors; D-A lubricants; DeWalt saws; Diamond crushers; Galion graders and rollers; Gar-Bro concrete-placing equipment; Harnischfeger P&H excavators; Hercules diesel and gasoline engines; I. E. L. power chain saws; Ingersoll-Rand air

(Continued on next page)

The fourth of a series in the interest of more efficient use of steel... a vital American resource.

INHERENT STRENGTH



The actual inherent strength of rail steel is fully harnessed for work in the Laclede Multi-Rib bar design. Rail steel rolled into bars with Multi-Rib design offers a yield strength in excess of 55,000 PSI—with greatly increased anchorage. Laclede Multi-Rib Reinforcing Bars meet the new ASTM Specification A 305, which provides a long-needed yardstick for anchorage in reinforcing bars, assuring a more efficient use of steel.

Modernize your specifications with ASTM A 305
Modernize your steel reinforcing with Laclede Multi-Rib Bars



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St. Louis, Mo.

DIESEL'S THE POWER . . . Sheppard's THE DIESEL



- 33 H.P. two cylinder power unit. Delivered ready for work.
- Efficient full-diesel operation on any one of 15 different fuels.
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- Available as 2,000 to 36,000 watt generating set for night lighting or auxiliary use.

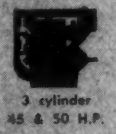
SHEPPARD DIESELS, Hanover 11, PA.

Sheppard
DIESELS
STATIONARY AND AUTOMOTIVE

POWER UNITS
3.5 to 100 H.P.



6 cylinder
90 & 100 H.P.



3 cylinder
45 & 50 H.P.



2 cylinder
30 & 33 H.P.



1 cylinder
13 & 15 H.P.



Aircooled
1 cylinder
5.4 H.P.

Put your equipment back on a paying basis with Sheppard Diesel power. Keep it on the job 3 to 5 times longer between engine overhauls. Handle only half as much fuel . . . save up to 75% on fuel costs! Send for FREE Sheppard booklet that shows how to put new life into your "tired" machines.

DEALERS—There's a big market for 3.5 to 100 H.P. Diesels. Investigate a profitable Sheppard franchise.

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OR BRIDGES . . .
WISCONSIN
HEAVY-DUTY
Air-Cooled
ENGINES
Deliver!



Whether building industrial plants, bridges, roads or railroads, Wisconsin Air-Cooled Engines deliver top performance on any power job or equipment within a 2 to 30 hp. range, supplying dependable, around-the-clock service, month after month, in any climate, any season of the year.

Heavy-duty features include: Timken tapered roller bearings at both ends of the crankshaft; high tension outside magneto with impulse coupling; nickel chrome molybdenum iron valve seat inserts; heat-treated drop forged steel crankshaft; heat resistant alloy steel forged rods and large volume capacity flywheel fan for efficient cooling at temperatures up to 140° F. LOOK AT THE ENGINE AS WELL AS THE MACHINE . . . and follow the lead of construction equipment manufacturers who specify "Wisconsin Engines" as standard power equipment.



WISCONSIN MOTOR CORPORATION
World's Largest Builders of Heavy-Duty Air-Cooled Engines
MILWAUKEE 14, WISCONSIN

Distributor Doings

(Continued from preceding page)

compressors and tools; Isaacson dozers; LeTourneau earth-moving equipment; Lidgerwood hoisting engines; Macwhyte wire rope; Pacific Car & Foundry Co. Carco winches; Scheu salamanders; and Wellman buckets.

B-G Dealer in Connecticut

Appointment of a Connecticut distributor is announced by the Barber-Greene Co. Wilhelm-Davies Co., Inc., of Wallingford, now has exclusive rights in the state of Connecticut for the B-G Construction and Industrial Division. The company is located at North Colony Road. Principals are C. R. Wilhelm, President, and D. J. Davies, Vice President and Treasurer. Sales Engineers are Louis J. Bacco and Phillip Bart.

Formal Opening in Texas

The Plains Machinery Co. has opened a new plant at 3500 N. E. 8th St., Amarillo, Texas. More than 1,000 guests were present at an open-house party held in honor of the occasion. Festivities included a barbecue lunch, entertainment, and the awarding of an International Harvester home-freeze unit. Plains Machinery also maintains offices and plants at Abilene, Odessa, and Lubbock.

Among the companies represented by Plains Machinery are the International Harvester Co., J. D. Adams Mfg. Co., Link-Belt Speeder Corp., Bucyrus-Erie Co., The Frank G. Hough Co., Ottawa Steel Products, Inc., American Road Equipment Co., Universal Engineering Corp., Pettibone Mulliken Corp., The T. L. Smith Co., Ingersoll-Rand Co., Littleford Bros., The Heil Co., Tampo Mfg. Co., Isaacson Iron Works, M-R-S Mfg. Co., The Superior Equipment Co., Northfield Iron Co., Lull Mfg. Co., Good Roads Machinery Corp., R. C. Higley Co., Lufkin Foundry & Machine Co., Spray Machines, Inc., Union Wire Rope Corp., American Tractor Equipment Corp., and Wm. Bros Boiler & Mfg. Co.

Herd Co. Adds New Lines

The Herd Equipment Co. of Oklahoma City has been appointed distributor for the International Harvester line of industrial power units. Other lines handled by Herd include Galion rollers and graders, Champion masonry saws and cutting blades, and the Wayne motor sweeper.

New Oakland, Calif., Co.

Formation of the Miller & Stilley Equipment Co. in Oakland, Calif., is announced by Howard Stilley and M. E. "Cap" Miller. Miller & Stilley is distributor in northern California for the LaPlant-Choate Mfg. Co. It is also distributor for the Tampo Mfg. Co.

Mr. Stilley formerly was Manager of the Soule Equipment Co. He also served with R. G. LeTourneau, Inc. Mr. Miller, too, was associated with these same two companies. The Miller & Stilley plant is located at 1022 77th Ave. in Oakland.

Distributors for Gumout

Appointment of several new distributors for Penn Drake Gumout is announced by the Pennsylvania Refining Co. Gumout is described as a liquid solvent for gum, varnish, and lacquer deposits found in automotive fuel systems.

Dealers in Indiana include Fleener Auto Parts, Alexandria; C. W. Huber, Inc., 123 N. Main St., Crown Point;

Ryan Auto Parts Co., 602 E. Washington St., Indianapolis; and Philmore Corp., 23 E. Broadway, Shelbyville. Wombwell Automotive Parts Co., 151 E. Short St., Lexington; and Fulton, Conway & Co., 805 W. Main St., Louisville, are dealers in Kentucky. In Ohio,

new dealers are Wombwell Cincinnati Engine & Parts Co., 612 Broadway, Cincinnati; and Dixie Auto Parts Co., 780 N. High St., Columbus.

In the Minneapolis-St. Paul area, Pennsylvania Refining Co. has selected
(Concluded on next page)

POWER to Drill Faster! DRILLS to Fit Any Job!



Van Dorn
1-1/4"
Heavy-Duty
Electric Drill



Van Dorn
1/4" HOLGUN*

Big Drills, little Drills, Van Dorn gives you the right Drill for every job! Watch a Van Dorn Drill on the job and you'll marvel at its speedy drilling, easy handling, trouble-free running. Check its engineering and you'll find a powerful Van Dorn - built motor, ball-bearing mounted; husky gears, shaft, chuck spindle and housing; quality-built construction right down the line! Ask your nearby Van Dorn Distributor for details on Drills from 1/4" to 1 1/2" capacity. Write for free catalog to: The Van Dorn Electric Tool Co., 787 Joppa Road, Towson 4, Md.

*Trade Mark Reg. U. S. Pat. Off.

For Power
Specify

Van Dorn
(DIV. OF BLACK & DECKER MFG. CO.)
PORTABLE ELECTRIC TOOLS

Cut your Asphalt Costs on those small mix jobs!

The Foote Kinetic Asphalt Mixer with its new mixing method will give you eight to ten batches more per barrel of asphalt.

This will soon pay for the mixer! It can be towed behind any truck or car, handles any cold mix without additional equipment and can handle hot mixes in conjunction with kettles.

Capacity 3 cu. ft. in 30 seconds. Ask for Bulletin K-100.

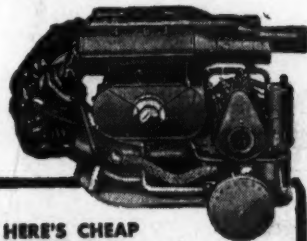


the **FOOTE**
Kinetic
mixer

THE FOOTE CO., INC.

1916 State St., Nunda, New York
Subsidiary of Blaw-Knox Co.

A BLAW-KNOX PRODUCT



HERE'S CHEAP
PORTABLE

HEAT FOR ALL

Portable Heaters expedite winter work at small cost! Emergency heat for any purpose. **DRIES** concrete, plaster, grain, paint, lumber, etc. **STARTS** cold motors, trucks, tractors, airplanes, etc. **THAWS** frozen materials, plumbing, machinery and men. These Stewart Warner war surplus pre-heaters produce 100,000 B.T.U.'s per hour on 1 1/2 gallons gas and deliver same anywhere thru three long ducts. Starts like outboard motor. Order now... Supply limited. Spare parts available. Enclose check or money order or send 1/2 deposit, balance C. O. D. with privilege of examination.

New and unused	Rebuilt and test run
\$330.00	\$330.00
Now	Now
\$295.00	\$187.50
F.O.B.	F.O.B.

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YORK, PA.

Turn to pages 110 and
111 for unusual Trading
Post opportunities.

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For further information on the new equipment, new material, and new literature described in this issue of

Contractors and Engineers Monthly,

check the item numbered on the enclosed Red Request Card. No obligation, of course, and we will forward your request directly to the manufacturer.

**CONTRACTORS
AND
ENGINEERS
MONTHLY**

470 Fourth Ave., New York 16, N. Y.

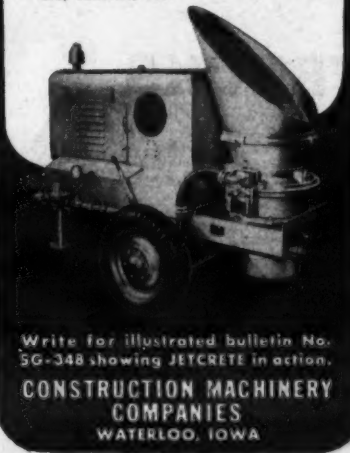
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**SHOOTS STRONGEST
CONCRETE FASTER**

"Welding with Concrete" best describes the new CMC JETCRETE method of pneumatically applying concrete. JETCRETE is the most nearly perfect concrete known today. Wherever and whenever used, JETCRETE has done the job better, faster—and at lower cost! The machine with a thousand uses!

- ★ **BUILDING** . . . walls, roofs, partitions, fences, fire retardants, etc.
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- ★ **WATERPROOFING** . . . Reservoirs, tunnels, tanks, drains, fissures, water basins, etc.
- ★ **FIREPROOFING** . . . Wood, structural steel . . . buildings and mines, etc.
- ★ **PRESERVING** . . . Brick, concrete, steel, tile, stucco, wood, iron, spillways, turbine chambers, piers, sewers, tunnels, etc.



Write for illustrated bulletin No. 3G-348 showing JETCRETE in action.
CONSTRUCTION MACHINERY COMPANIES
WATERLOO, IOWA

CONTRACTORS AND ENGINEERS MONTHLY

470 Fourth Avenue, New York 16

Enclosed is my remittance of \$3 for the next twelve issues of CONTRACTORS AND ENGINEERS MONTHLY.

Name _____

Position _____
(Or Type of Business)

Address _____

City _____
N. B., Cash, check or postage stamps will be entirely acceptable.

Distributor Doings

(Continued from preceding page)

Elliott Auto Supply Co., 1211 W. Broadway; Ben Frank Co., 1206 Harmon Place; Holm Bros., 20 E. Hennepin Ave.; M & I Auto Parts, 1124 Glenwood Ave.; Ritefit Auto Supply Co., 1222 Harmon Place; Minnesota Tire Co., 189 E. 8th St.; Paulson & Meredith Auto Supply, 1566 Selby Ave.; and St. Paul Jobbing Co., 205 W. 7th St.

Calif. Equipment Dealer

Products of the Wood Mfg. Co. are distributed in California by the Weco Equipment Co., 6900 Tujunga Ave., North Hollywood, Calif. Wood manufactures the Roadmixer, Preparer, and other road-building and maintenance equipment. Other manufacturers represented by Weco include the Pacific Wire Rope Co., Reed Battery Corp., and the Claude C. Wood Co., maker of chip spreaders.

Equipment Dealer in La.

C. T. O'Connor has been named Manager of the Engine Division of Boyce-Harvey Machinery, Inc., of Baton Rouge, La. This company distributes Caterpillar equipment in the south Louisiana territory. It maintains branches at Lake Charles, New Orleans, and Morgan City, all in Louisiana. Principals of the company include James H. Boyce, President, and J. N. Harvey, Sales Manager.

Portland Dealer Moves

The Contractors Equipment Corp. of Portland, Oreg., has moved to new quarters at 2727 S. E. Union Ave. Among the companies it represents are Acme Wire & Iron Works, All-Purpose Spreader Co., American Road Equipment Co., Blaw-Knox Division, Carver Pump Co., Davey Compressor Co., W. E. Grace Mfg. Co., Flink Sales Co., Gledhill Road Machinery Co., Hetherington & Berner, Inc., Independent Pneumatic Tool Co., Kennedy-Van Saun Mfg. & Engg. Corp., Knickerbocker Co., Lewis-Browning Mfg. Co., Inc., Malsbary Mfg. Co., Manitowoc Engineering Works, Moorhead Machinery & Boiler Works, Porter-Cable Machine Co., Quincy Compressor Co., Rodgers Hydraulic, Inc., Rome Grader & Machinery Division, Rosco Mfg. Co., Seaman Motors, Inc., Simplicity Engineering Co., Stow Mfg. Co., Unit Crane & Shovel Corp., Universal Engineering Co., and Wickwire Spencer Division.

Manager in Sioux Falls

Earl H. Thorsen has been named Manager of the Phillippi-Murphy Equipment Co. of Sioux Falls, S. Dak. The company announces at the same time that Joe E. Hexamer will devote his full time to sales activities in the southeastern South Dakota territory. F. M. "Hermie" Hermanson, formerly with Smith, Inc., Fargo, N. Dak., will cover the northwestern counties in Wisconsin.

Nolan Joins Credle Equip.

Credle Equipment, Inc., announces the election of Ralph H. Nolan as Executive Vice President and Treasurer.

The Credle company is located at 309 N. Genesee St. in Utica, N. Y. Among the companies it represents are Harnischfeger Corp., La Plant-Choate Mfg. Co., Inc., Rome Grader & Machinery Division, Huber Mfg. Co., Universal Engineering Corp., Mixermobile Manufacturers, Chicago Pneumatic Tool Co., Novo Engine Co., Mall Tool Co., and A. Leschen & Sons Rope Co.

G. E. Sprackling Joins LEC

George E. Sprackling has been appointed Sales Manager of the Lancaster Engineering Corp. of Lancaster, Pa. The company handles the distribution of Buda and Wisconsin engines, Schramm air compressors, Oliver Cletrac tractors, and LaPlant-Choate earth-moving equipment.

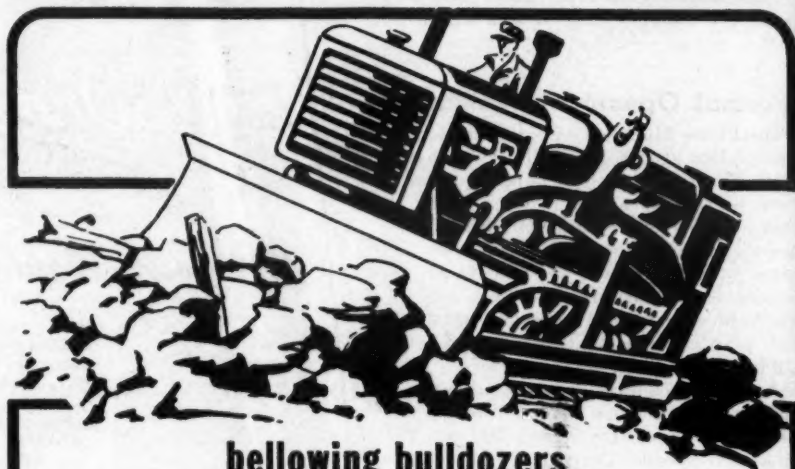
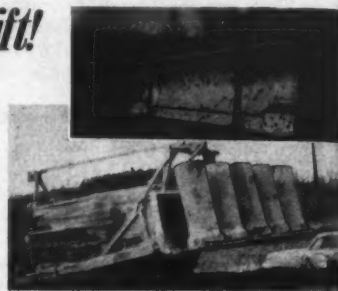
Make Your Dozer a Fork-Lift!

Now, easily attached forks convert a dozer into a hauling and carrying unit in a jiffy. Simply hang the forks from the top of the blade, lay on a few planks and you have a platform 31" wide, the full length of the blade. Forks adjustable to blades 22" to 46" in height. Platform can be loaded at ground level or from a truck. Now you can haul pipe, cement, or other materials and equipment anywhere a tractor can go. Dozer forks are simple and economical. Write for folder.

*Pat. Pending

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bellowing bulldozers call for MOTUL OILS and GREASES

Heat and friction, dirt and dust cause excessive wear...frequent breakdowns. That's why the right lubricant for every moving part is vital. MOTUL oils and greases apply a tough, lasting film to moving parts...help keep you operating at top efficiency.

Call on a Swan-Finch engineer today. He will be glad to specify the correct lubricants to meet your special requirements.



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THE OWEN LOADER

a complete unit for material handling

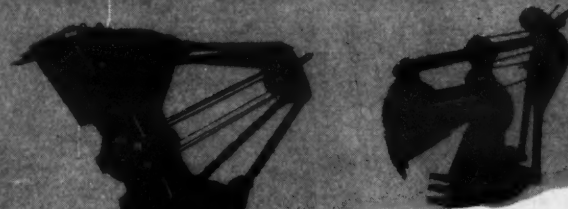
One man and an Owen Loader can dig and load one yard per minute! When installed on a truck you load, haul and dump with one unit...one man! The Owen Loader will speed any job, pay for itself...and make profit for you.

1½-yd. snow bucket and bulldozer blade available as extra equipment. Write to us for specifications on the Owen Truck Loader or see your Case Industrial Dealer if interested in Owen Tractor Loaders.

Sole Licensee under Owen patents.

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You Can't Beat Welded Construction



WELLMAN Williams Type BUCKETS

Wellman pioneered welded rolled steel construction for longer life and greater service. It's the extra strength that gives the extra, low-cost digging power. Whatever your requirements...whether for Multiple Rope, Power Arm, Dragline, Power Wheel or Special Service—specify Wellman! ¾ to 16½ yd. capacity.

SEND FOR BULLETIN

THE WELLMAN ENGINEERING CO.
7012 CENTRAL AVENUE • CLEVELAND 4, OHIO

Tracherous Ground At Tunnel Excavation

(Continued from page 3)

compressor house was a 2,500-cfm Ingersoll-Rand air compressor. Three huge blowers outside the tunnels forced fresh air back in to the miners through 16 and 18-inch Naylor pipe.

Each heading also used an International TD-14 tractor with a rear-end hoist and boom, for the purpose of loading and handling the heavy 8-inch steel supports.

Tunnel Excavation

Despite the size of this tunnel, and the problems involved, one week saw 151 feet drilled and mucked. The company used a bonus incentive plan, based on a sliding scale, for excess footage over and above a normal day's work. This permitted the miners to earn extra money over and above their union wage scale when good records were turned in.

From 4 to 8 feet was removed each time a shot was pulled. A minimum of 78 holes and a maximum of 115, depending on the formation found, was necessary per shot. Many times the crews drilled out and loaded in 3 hours. The holes were drilled with three Ingersoll-Rand 35 drifters on the rail-mounted jumbo and five such machines on the Euclid-mounted jumbo beneath. I-R type 15 detachable stud bits were used.

The holes were then loaded with Hercules 2X and Gold Medal 40 per cent explosives. Hercules delays from 1 to 10 were used to pull the material in towards the center, and the shots were fired from the electric power line.

Full headings were drilled and shot in one operation, and the material was often mucked out in 3½ hours. Five Koehring Dumpsters took the broken stone from the mucking machines and hauled it away to waste areas along the river.

The 8-inch steel H-beams were then hauled in on one of the Dumpsters and set in place by the TD-14-mounted crane. Centers ranged from 12 to 48 inches, depending on the type of ground. Much of the ground showed a definite tendency to squeeze, and in one section of the tunnel where cross braces had been placed, these members squeezed into a warped, distorted mass of steel.

At the time the job was visited, only a few concrete invert pours had been

made. Details of the lining of this tunnel project will appear in a future issue.

By operating carefully and slowly in the wet places and shale, the men proceeded safely to push the tunnel through without mishap. In the drier, more favorable places, all hands worked like mad to earn some of that bonus money. One bad slide caved one of the jumbos in and slightly injured several miners. Another temporarily blocked one of the portals in Woody's Well. But aside from these pieces of bad luck, the use of steel support members proved to be a very good investment in safety and strength.

Before the project was finished, Project Manager Woody Williams himself was openly referring to a certain water-logged sink hole near the center of one of the spreads by the name the miners had given it—"Woody's Well".

Heavy-Duty Power Hammers

An information sheet on Little Giant power hammers is being distributed by Little Giant, Inc., 194 Rock St., Mankato, Minn. These power hammers are manufactured in 25, 50, 100, 250, and 500-pound sizes. They are furnished with either belt or motor drive.

The sheet lists specifications for the forging capacity, size of material handled, maximum length of stroke, rpm and hp ratings, weight, and dimensions for each hammer in the Little Giant line. Described in detail are the hard-maple blocks, frame and saw block, ram, crank-shaft bearings, dies, and lubrication system. The sheet also lists the various sizes of rams available for use with each of the hammers, and tabulates parts, their numbers, and their prices. An accompanying photograph pictures each part and gives its number.

Copies of this literature may be ob-

tained from the company. Or use the enclosed Request Card. Circle No. 91.

Materials Standards

Two new series of standards have been compiled in book form by the American Society for Testing Materials. One deals with the ASTM standards on mineral aggregates, concrete, and non-bituminous highway materials; the other contains the ASTM standards on bituminous materials for highway construction, waterproofing, and roofing.

The first bulletin is sponsored by Committee C-9 and contains 10 specifications, 18 test methods, and 6 definitions for concrete aggregates. There are 17 specifications, test methods, and definitions covering concrete. And there are 4 specifications for cement, 7 specifications for brick and block-pavement materials, and several miscellaneous specifications and tests. It is 200 pages long and sells for \$2.25.

The other bulletin is sponsored by Committees D-4 and D-8. It includes

all standards and tentative specifications, test methods, recommended practices, and definitions in the fields covered by these two committees. Also included are standards for creosoted wood. The booklet discusses test methods for emulsified asphalts and bitumens; distillation of cut-back asphaltic products and tar products; float tests for bituminous materials; sieve analysis of granular mineral surfacing and non-granular mineral surfacing; softening point of bituminous materials and tar products; specific gravity of road oils, tars, asphaltic cements, soft-tar pitches, and asphalts; and viscosity by means of the Saybolt viscosimeter.

There are 18 specifications for highway-construction materials including asphaltic cement, asphalt fillers, asphalt plank, coal-tar pitch for stone-block fillers, tar, etc.; and for bituminous-paving-plant requirements. The book is 317 pages long and costs \$3.00. Both books can be obtained by writing directly to the ASTM at 1916 Race St., Philadelphia 3, Pa.

WORLD'S LARGEST MOTO-CRANE



lifts and transports
up to 45 Tons
with its two
WAUKESHA
Diesels

The Lorain MC-820 Moto-Crane has two WAUKESHA Super-Duty DIESELS (Model WAKD) six cyl., 6¼ x 6½ in., 1197 cu. in. displ. One engine propels the rubber-tired carrier which transports the unit (weight 65 tons) at 18 m.p.h. The second Waukesha Diesel installed in cab of crane (as shown below) powers revolving turntable, hoist, swing and boom derricking; supplying power to lift loads up to 90,000 lb.



● New fields in heavy material handling by mobile equipment, are being opened by this giant, rubber-tired two-engined crane. Said to be the world's largest, the first of these Waukesha-Diesel-powered Lorain MC-820 Moto-Cranes is working in the world's largest steel mill. It has a safe-rated lifting capacity of 45 tons (90,000 lb.) at a 12-ft. radius. Thirty years ago when Thew built the first portable crane—also a Waukesha-powered Lorain—its capacity was only 3½ tons. The latest Lorain's ability to lift and transport far heavier loads than any previous portable crane, extends the basic advantages of the moto-crane for handling heavy material in steel mills, steel erection, ship and bridge building, oil fields, logging and many other industries.

A crane is no better than its engines. With their 30 years of motorized crane experience, Thew Shovel Company engineers chose two big Waukesha Super-Duty Diesels to power the world's largest moto-crane. Waukesha Diesels are winning recognition everywhere as the world's finest power plants of their size and type. Get Bulletin 1415.

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"Essential Equipment" Say Construction Men

**COFFING
HOIST-JACKS**
IT'S A HOIST!
IT'S A JACK!
IT'S A PULLER!

"Our men could not operate without the Coffing Hoist-Jacks—a day never passes but what they are used."

"They are invaluable in repairing, in trestle work to straighten up piling for capping and to space caps for stringers. They are also used in cofferdams to straighten struts that are displaced by the excavator or pile leads or hammer."

(Signed)

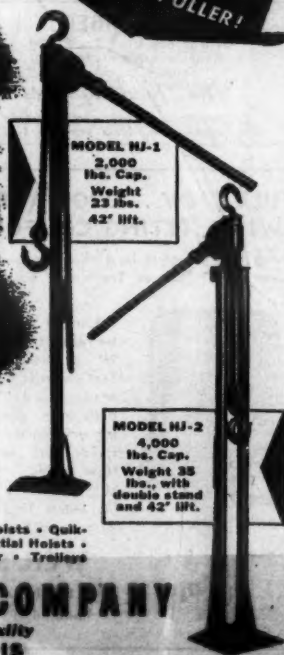
W. D. Andrews,
Contracting Construction Co.
Danville, Illinois

Get more work done, faster and safer with the versatile Coffing Hoist-Jack. Use it with stand as a jack or without stand as a hoist or puller. Tested to 100% over rated capacity, Hoist-Jacks are built for heavy duty jobs, easy operation and maximum safety. For complete information, write today for Bulletin CHJ-1.

OTHER COFFING PRODUCTS: Safety-Pull Hoists • Quick-Lift Electric Hoists • Load Binders • Differential Hoists • Spur Geared Hoists • Mighty-Midget Puller • Trailers

COFFING HOIST COMPANY

A Quarter Century of Quality
DANVILLE, ILLINOIS



HOSE SALE

BRAND NEW 4-INCH DISCHARGE HOSE

Brand new Goodrich 4-inch Discharge Hose (or Fire Hose). 200-lbs. pressure, rubber-lined, complete with male and female bronze couplings, in 50-ft. lengths—only 60c per ft. (or \$30.00 per 50-ft. length complete with fittings).

USES: Portable Pipe Lines; Fire Hose, Handling Water, Liquids, etc.; Sewer & Trench Work; Manholes; Discharge on Pumps; Mines; etc.

SALE PRICE.....per ft. 60c
50-ft. length complete with fittings.....\$30.00

BERNSTEIN BROTHERS

Since 1890

Pueblo, Colorado

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FOR SALE OR RENT STEEL SHEET PILING

1800 PCS. BETH. 23 lb., 18 to 32 ft.
210 PCS. BETH. 27 lb., 20 to 27 ft.
700 PCS. BETH. 32 lb., 2 — 32 ft.
THE DARIEN CORPORATION
60 E. 42nd St. New York 17, N. Y.

RENT WITH PURCHASE OPTION

Paving Equipment
Forms, Blins, Finishers, Pavers, etc.

DRAVO-DOYLE COMPANY

2401 Preble Ave. Pittsburgh 12, Pa.

Used Equipment For Sale

Located at
Ray Construction Company Yard—
Mobile Highway—Pensacola, Florida

SUBJECT TO PRIOR SALE

- 1—Kinney Asphalt Distributor, 812 gal. mounted on Mack Truck.....\$4,000.00
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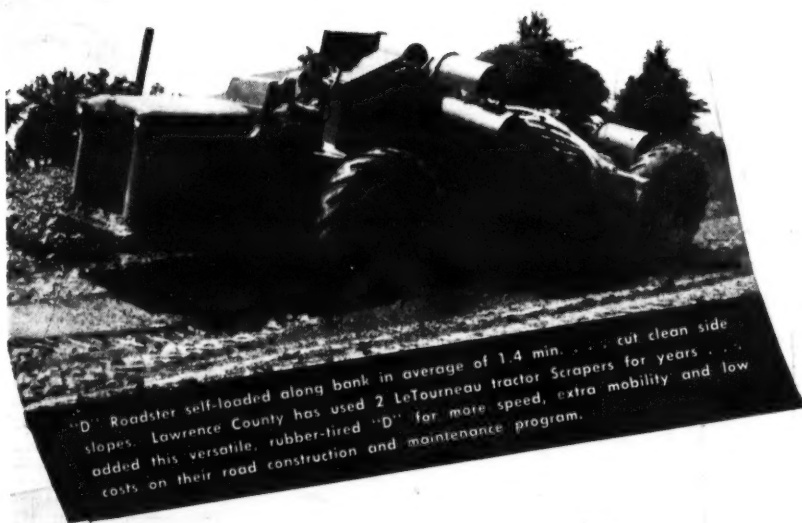
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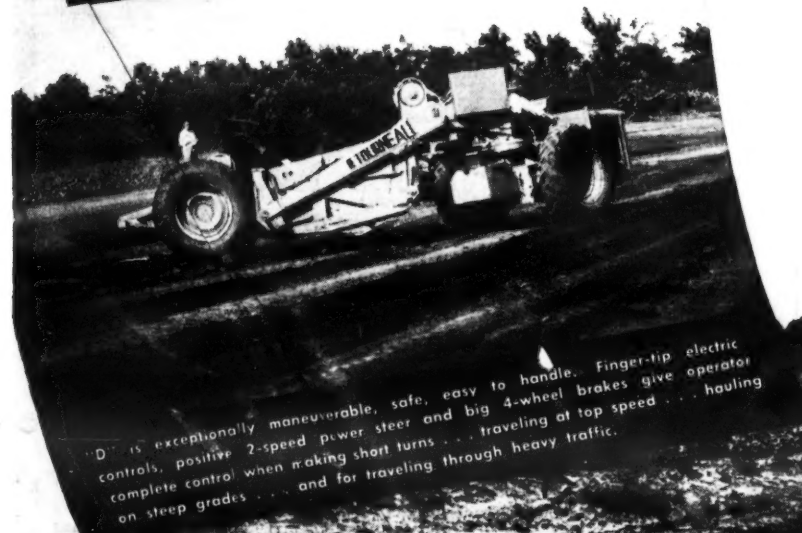
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